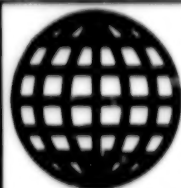


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**FOREIGN  
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# ***JPRS Report***

# **Science & Technology**

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***USSR: Life Sciences***

# Science & Technology

## USSR: Life Sciences

JPRS-ULS-90-014

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UDC 612.824:612.26+612.886

**Blood Circulation of Oxygen Tension in Brain of Wakeful and Anesthetized Rabbits Under Antiorthostatic Effect**

907C0507A Leningrad FIZIOLOGICHESKIY  
ZHURNAL SSSR IMENI I. M. SECHENOVA  
in Russian Vol 75 No 11, Nov 89 pp 1548-1553

[Article by A. I. Beketov and Ye. I. Konyayeva; Department of Pharmacology With the Course Clinical Pharmacology (head, A. I. Beketov), Crimean Medical Institute, Simferopol; Laboratory of Comparative Physiology of the Blood Circulation (head, Yu. Ye. Moskalenko) of the Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenova, USSR Academy of Sciences, Leningrad]

[Abstract] An analysis of change of local blood flow and oxygen tension in different regions of the cerebral cortex and of general cerebral blood flow in wakeful and anesthetized rabbits in an antiorthostatic position included experiments on 23 wakeful and 4 anesthetized 2-3 kg rabbits. Change of local and general blood flow was studied by the hydrogen clearance method. Blood flow was measured every 5-10 minutes with rabbits in the initial position and under antiorthostatic effect created by tilting the axis of the body below the head by 45 degrees for 1 hour and after return to the horizontal position. Changes of  $P_{O_2}$ , arterial pressure and EKG were recorded. The most abrupt changes of systemic and organ hemodynamics developed in the first minutes after changes of the body position. The most typical and pronounced fluctuations of blood flow and blood pressure occurred in these periods and these changes represented primary reactions to postural effects. Changes of hemodynamics occurring after them were caused by interaction of the perturbation factor and compensatory mechanisms directed at an increase of the functional stability of the cerebral blood circulation system. Stimulation of the compensatory factors with the aid of different factors, including drugs, may promote adaptation of cerebral hemodynamics to extreme conditions of functioning against a background of hypertension reaction and decrease of heart rate. Figures 2; references 19: 18 Russian; 1 Western.

UDC 612.824:612.886

**Cerebral-Vascular Effects of Motion Sickness**

907C0507B Leningrad FIZIOLOGICHESKIY  
ZHURNAL SSSR IMENI I. M. SECHENOVA  
in Russian Vol 75 No 11, Nov 89 pp 1560-1567

[Article by Yu. Ye. Moskalenko, A. I. Beketov, V. F. Maksimuk and N. A. Skoromnyy; Laboratory of Comparative Physiology of the Blood Circulation (head, Yu. Ye. Moskalenko, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR

Academy of Sciences, Leningrad, Department of Pharmacology (head, A. I. Beketov, Crimean Medical Institute, Simferopol)]

[Abstract] Cerebral-vascular effects of motion sickness may be expressed not only and not so much in changes of the level of blood supply to the brain as in direct responses to such an effect, predominantly in changes of capacities of the cerebral blood circulation system to adapt to external effects accompanying motion sickness as the result of reconstruction of neurodynamic processes under its effect. At the same time, we must consider that changes of activity of the neurogenic component in the mechanism of regulation of cerebral blood circulation may affect not only qualitative indicators of this process but also the state of the water balance of the brain tissue if, against the background of motion sickness, a change of conditions of blood flow from the brain occurs. The latter is especially important to understanding the mechanism of the cosmic form of motion sickness since, under conditions of weightlessness, change of the afferent background of the organism, which may be imitated by producing motion sickness, is accompanied by an increase of blood filling of the superior vena cava. In view of these facts, this study was devoted to determination of the correctness of the above statements concerning the possibility of motion sickness affecting compensatory capacities of the system for regulating cerebral blood circulation both at the level of ensuring chemical homeostasis and physical homeostasis of nerve tissue. Experiments on rabbits with implanted electrodes showed a reduction of reactivity of the cerebral vascular system in response to physical and functional tests although the level of blood flow through the brain increased, generally. This indicated a decrease of compensatory capacities of the cerebral blood circulation system, which may change the brain tissue water balance, causing a change of the cerebral blood outflow, which may accompany motion sickness. Data concerning changes of brain tissue impedance under the combined effect of antiorthostasis and motion sickness and data concerning the dynamics of pulse waves of a brain tissue rheogram confirmed this position. Figures 4; references 12: 11 Russian, 1 Western.

UDC 612.13.06:612.014.477.064.014.49

**Central and Systemic Hemodynamics in Simulated Weightlessness**

907C0651A Moscow KOSMICHESKAYA BIOLOGIYA  
I AVIAKOSMICHESKAYA MEDITSINA in Russian  
Vol 24 No 1, Jan-Feb 90 (manuscript received  
25 Apr 88) pp 15-17

[Article by R. T. Kazakova and V. P. Katuntsev]

[Abstract] Central and systemic hemodynamics were assessed in six healthy males, 30-36 years old, subjected to simulated weightlessness for 7 days. Weightlessness was simulated by water immersion during daytime and -10°C antiorthostasis at night. The resultant monitoring



studies demonstrated pronounced time-related hemodynamic shifts. The diminished venous return seen in every subject on days 1-3 was interpreted to represent adaptive changes to blood volume redistribution. The mechanism involved the effects of excessive intrathoracic blood volumes on cardiac and vascular volume receptors, activation of which serves to enhance diuresis. As a result, the diastolic end volume falls by approximately 25 percent, a phenomenon that also appears as one of the first manifestations of cardiovascular decompensation in cosmonauts. Figures 4; tables 1; references 14: 10 Russian, 4 Western.

UDC 612.826.4.014.2].014.482.4.019.08

**Ultrastructural Alterations in Arcuate Nucleus and Medial Eminence Neuron Complex in Rats Subjected to Carbon Ion and Gamma Irradiation**

907C0651F Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 24 No 1, Jan-Feb 90 (manuscript received 17 Jun 88) pp 34-36

[Article by L. G. Gitsov, V. G. Burneva, L. B. Verbitskaya, R. A. Kabitsyna, and B. S. Fedorenko]

[Abstract] Female Wistar rats were subjected to irradiation with either accelerated carbon ions (300 MeV/nucleon, 120 MeV/cm<sup>2</sup>/g<sup>-1</sup> LET, 0.1 cGy) or gamma rays (1.9 cGy) to study the effects on the ultrastructure of the arcuate nucleus-medial eminence neuron complex. Observations made five weeks after carbon ion irradiation revealed a gamut of changes, consisting of both chromatolytic and hyperchromic alterations. Along with evidence of functional activation of some neurons and compensatory processes, others showed irreversible deterioration. However, studies with lanthanum nitrate indicated that the blood-brain barrier remained intact, and electron-dense inclusions tended to appear in the neuropil. In general, the ultrastructural manifestations of irradiation were less pronounced with gamma irradiation. Figures 3; references 6 (Russian).

UDC 613.693-092.6:612.766.2]-07

**Relationship Between Orthostatic Stability and Post-Space Flight Vestibular Function in Man**

907C0651H Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 24 No 1, Jan-Feb 90 (manuscript received 22 Feb 89) pp 49-50

[Article by V. M. Mikhaylov, L. N. Kornilova, A. F. Zhernavkov, A. D. Voskresenskiy, Yu. D. Pometov, and V. N. Alekseyev]

[Abstract] Analysis of the relationship between orthostatic stability and vestibular function was performed on ten cosmonauts after 75 to 184 days of space flight aboard the Salyut-6 space station. Orthostatic and vestibular function tests conducted upon landing and 5-6 days later showed functional deterioration in both tests.

In addition, a positive correlation coefficient was obtained for centered results of both tests ( $r = 0.55$ ,  $p < 0.05$ ), with a linear regression equation of orthostatic stability =  $0.42 \times$  vestibular function. In the case of vestibular function a positive correlation was obtained between days 0 and 5-6 equal to 0.86. It was also positive but less pronounced in the case of orthostatic stability. Figure 2; tables 1; references 9: 8 Russian, 1 Western.

UDC 616.859.1-07:617.761-009.24-07

**Relationship Between Vertical Optokinetic Nystagmus and Susceptibility to Motion Sickness**

907C0651I Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 24 No 1, Jan-Feb 90 (manuscript received 26 Oct 88) pp 50-52

[Article by O. A. Vorobyev, V. V. Zaritskaya, and Yu. V. Krylov]

[Abstract] A study was conducted on the relationship between vertical optokinetic nystagmus and motion sickness on 92 healthy males, ranging in age from 18 to 22 years, under conditions of simulated weightlessness. On the basis of the results the group was divided into the following three categories: I - 29 men with no sign of motion sickness, II - 34 with moderate motion sickness, and III - 29 men with pronounced symptoms. The data demonstrated that factors affecting the vestibular apparatus—primarily otolithic receptors—and redistribution of body fluids in the cranial direction modify vertical optokinetic nystagmus to a much greater degree in subjects who are susceptible to motion sickness. These findings confirmed the importance of hemodynamics in the pathogenesis of motion sickness, as well as the fact that studies on vertical optokinetic nystagmus, particularly of downward predominance, may be of prognostic value regarding susceptibility to motion sickness during space flight. Tables 3; references 12: 5 Russian, 7 Western.

UDC 612.74.06:612.766.1].06:612.014.477.064].08

**Color Selection in Luscher Test as Emotional Status Indicator in Flight Personnel**

907C0653A Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 24 No 2, Mar-Apr 90 (manuscript received 4 Jan 89) pp 15-18

[Article by O. N. Kuznetsov, V. A. Yegorov, and B. S. Frantsen]

[Abstract] Color selection in the Luscher test was used in the assessment of emotional status of 40 flight instructors in various flight-related situations. In comparison with the population at large, flight personnel showed preference for cooler colors, such as blue, green, or violet, in distinction to preference for warmer colors (red



or yellow) in the general population. The preference for the cooler colors is taken to reflect emotional stress encountered by the pilots in day-to-day situations. In particular, preference for violet and green, a mixture of blue and red or blue and yellow, is understood to reflect adaptability and flexibility in the face of stress. References 8: 6 Russian, 2 Western.

UDC 612.122/.123+[612.129:577.17]:613.693].08

**Circadian Patterns in Plasma Lipids, Carbohydrates, and Some Hormones of Healthy Pilots**

907C0653B Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 24 No 2, Mar-Apr 90 (manuscript received 20 Feb 89) pp 21-23

[Article by Ye. Ye. Nikolayevskiy]

[Abstract] A comparative analysis was conducted on the circadian patterns of plasma lipids, hormones, and blood sugar in 30 healthy pilots, 30-39 years old, and an age- and health-equivalent group of 15 non-flight specialists. The results demonstrated that the mean daily lipid and hormone levels in the pilots exceeded the corresponding control levels, usually by a factor of one-fold or better (1.294-fold for cholesterol). In the case of blood sugar the relationship was reversed, with the level in the control subjects exceeding the value in pilots. Differences between the two groups were also noted in acrophase values and amplitude parameters. The most pronounced differences in acrophase were noted for blood sugar (19 h 35 min pilots; 05 h 43 min controls), beta-lipoproteins (19 h 26 min pilots; 16 h 23 min controls), and cholesterol (13 h 02 min pilots; 18 h 56 min controls). In general, the shifts were interpreted to reflect pilot adaptability in the face of stress, with the conclusion that these biochemical values may be used in assessment of occupational fitness. Tables 1; references 22: 15 Russian, 7 Western.

UDC 613.65:629.7.047.2]:612.763

**Experimental Assessment of Effect of Head Position on Center of Gravity of Human Body in Ejection Seats**

907C0653C Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 24 No 2, Mar-Apr 90 (manuscript received 5 May 89) pp 24-25

[Article by G. G. Demirchoglyan, Yu. G. Konakhevich, V. Kh. Petlyuk, R. V. Peshkov, P. N. Khlomenok, L. N. Sholpo, and V. I. Brazhnik]

[Abstract] Kinematic experiments were performed on 55 pilots to assess the effects of head inclination on the body's center of gravity in ejection seats. The purpose was to obtain quantitative data relating trajectory of the

ejection seats in relation to anthropometric characteristics, employing a dynamographic stand designed to measure such effects. The results and mathematical formulation used in the evaluation shall be published separately. However, a two-factor regression equation relating head inclination to change in the center of gravity has been derived and used for graph construction. Figures 2; tables 1; references 1 (Russian).

UDC 616.718.5-092:612.766.2]-073.432.19

**Ultrasonic Assessment of Human Tibia During 370-Day Antiorthostatic Hypokinesia**

907C0653D Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 24 No 2, Mar-Apr 90 (manuscript received 11 May 89) pp 29-31

[Article by A. M. Tatarinov, S. L. Dubonos, Kh. A. Yanson, V. S. Oganov, V. V. Dzenis, and A. S. Rakhmanov]

[Abstract] Studies were conducted on ultrasonic assessment of the effects of simulated weightlessness and exercise therapy on human long bones, employing 9 men, 27 to 41 years old. The subjects were maintained in an antiorthostatic position for 370 days. Exercise therapy was constant throughout the experiment in five of the subjects, and in four was started at the beginning of the fifth month. Acoustic profiles for 120 kHz waves revealed considerable individual variations in average velocity, average velocity in the diaphyses, and decrement values in velocity along the distal half of the tibia. One year after the experiment all values had returned to baseline levels, and the resultant data confirmed the beneficial effects of exercise on human long bones in simulated weightlessness. In addition, sound propagation along the length of the diaphysis and decrement in velocity in the distal part of the tibia were observed to be diagnostically the most informative values. Finally, ultrasonic assessment was shown to offer a rapid, non-invasive means of bone evaluation and provide earlier indication of changes than  $\gamma$ -photon absorptiometry. Figures 2; tables 1; references 15: 9 Russian, 6 Western.

UDC 612.223.11+612.273.2]:014.49

**Tolerance Criteria in Hypercapnic-Hypoxic Test**

907C0653F Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 24 No 2, Mar-Apr 90 (manuscript received 3 May 88) pp 46-48

[Article by A. S. Nekhayev and Yu. I. Andriyenko]

[Abstract] The hypercapnic-hypoxic test was administered to 84 healthy men ranging in age from 19 to 34 years, with a view toward setting tolerance criteria. The test was applied 1.5 to 2 h after breakfast and involved rebreathing air from a 10 L bag. Data on the heart rate, blood pressure, respiratory rate, and minute respiratory

volume led to classification of the subjects into four tolerance groups: poor, 16.7 percent; average, 35.7 percent; good, 27.4 percent; and excellent 20.2 percent. The duration of the test to refusal ranged from 5 to 9 min, with the critical tolerance correlated with an increase in the minute respiratory volume to 40 L/min. The latter was preceded by a sharp increment in the minute respiratory by 10 L/min in the last one or two minutes. Tables 1; references 3 (Russian).

UDC 612.223.11.08:[612.233+612.12+612.461

#### **Effects of Long-Term Hypercapnia and Hypoxia on Composition of Exhaled Air, Gas Exchange, and Blood and Urinary Clinical Chemistries**

907C0653G Moscow *KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian* Vol 24 No 2, Mar-Apr 90 (manuscript received 18 Jul 88) pp 49-51

[Article by V. P. Savina, V. Ye. Ryzhkova, Ye. I. Nikitin, T. N. Balandina, L. Kh. Bragin, A. K. Sivuk, V. P. Bychkov, and G. G. Bobrova]

[Abstract] The metabolic effects of exposure of 4 healthy men, 41-59 years old, to an atmosphere consisting of 1.1-1.5 percent CO<sub>2</sub> and 19-19.5 percent O<sub>2</sub> in a closed chamber for 40 days were assessed. The clinical chemistries demonstrated activation of lipid peroxidation and attenuation of plasma and erythrocyte catalase activities. These changes were particularly pronounced on days 22 and 39. The increase in plasma concentrations of malonic dialdehyde was directly correlated with pentane and isopropanol levels in expired air ( $r = +0.99$ ), and inversely correlated with diminished lactase activity ( $r = -0.76$ ). In addition, gas exchange was enhanced by 20-32 percent on days of exposure to 4 percent carbon dioxide, while the acid-base balance corresponded to respiratory acidosis. One week after the experiment was discontinued all biochemical indicators returned to baseline levels, with the exception of urinary indicators which continued to reflect depressed nitrogen metabolism. Figures 1; tables 3; references 11: 9 Russian, 2 Western.

UDC 629.78:574.682]:612.79

#### **Functional Status of Skin in Small, Airtight Chambers**

907C0653H Moscow *KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian* Vol 24 No 2, Mar-Apr 90 (manuscript received 28 Sep 88) pp 51-54

[Article by A. A. Berlin]

[Abstract] Healthy male and female subjects, 19 to 65 years old, were employed in an experiment designed to assess the effects of a small, airtight chamber on the functional status of the skin in order to simulate changes that may occur during space flight. Evaluation of a number of parameters over a 90 day period of enclosure

demonstrated a two-fold increase in the rate of desquamation, as well as a two-fold increase in the lipid content. In addition, the pH increased from 5.30-5.65 to 6.36-6.53, and the skin redox potential fell by almost 100 percent. These changes, in conjunction with loss of moisture, indicated deterioration in the skin as a barrier to infection. Tables 4; references 9 (Russian).

UDC 629.78.048:[612.014.482.06:612.014.477.063

#### **Effects of Combined Physical and Chemical Radioprotective Measures in Simulated Acceleration Studies**

907C0653J Moscow *KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian* Vol 24 No 2, Mar-Apr 90 (manuscript received 15 Dec 88) pp 60-61

[Article by M. Minkova and T. Pantev, Bulgaria]

[Abstract] An evaluation was conducted on the radioprotective effects of a combination of physical and chemical measures in 160-170 g male Wistar rats subjected to 2 Gy gamma irradiation one hour after 5 min of acceleration to +5 Gx. The abdominal and lumbar areas were protected with a 2.5 mm thick lead shield while adeturon (50 mg/kg; intraperitoneal) was administered 15-20 min before irradiation. Histopathologic changes in the bone marrow, spleen, and small intestine in the various groups of experimental and control rats demonstrated that acceleration detracted from the therapeutic benefit of adeturon, to the point where the synergistic phenomenon was completely abolished. The combination of adeturon and acceleration had a particularly adverse impact on the small intestine, indicating that under conditions involving acceleration physical radioprotection alone might be the protective modality of choice. Figures 1; references 9 (Russian).

UDC 612.13+612.17].06:[613.863-02.612.825.8

#### **Stress and Human Circulation**

907C0659B Moscow *KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian* Vol 24 No 2, May-Jun 90 (manuscript received 9 Nov 89) pp 35-40

[Article by B. M. Fedorov, T. V. Sebekina, T. M. Sinitsyna, Ye. N. Streltsova, V. M. Vakulenko, and T. G. Nikolayeva]

[Abstract] A variety of research and diagnostic techniques, including EKG, Doppler echocardiography, <sup>133</sup>Xe labels, etc., were employed in an assessment of human cerebral and systemic circulation during stress. The study encompassed over 100 healthy males ranging in age from 25 to 45 years. The results demonstrated that intense mental activity potentiated cerebral blood flow, particularly in the supramarginal convolution of the brain, as well as in the angular convolution and in the parietotemporal and occipital region of the left cerebral

hemisphere. In most cases an increased flow was also detected in the upper frontal convolution, Broca's convolution, and the superior temporal convolution. Prolonged bed rest was also observed to be a stressful situation predisposing to hypertension. The data were consistent with the view that maximum mental concentration was accompanied by a decrease in the heart rate, but that in the majority of cases changes in regional and systemic hemodynamics are predicated on the emotional component of any activity. Cerebral hemodynamics in situations of intense mental activity appear to be closely connected to processes directed at maintaining optimum mental function and seem to be adaptive in nature. In general, mental activity within the framework of time constraints evoked hemodynamic changes that were as pronounced as those induced by submaximal physical demands. Figures 3; references 36: 20 Russian, 16 Western.

UDC 612.858.3.014.43:519.86

#### Mathematical Model of Thermal Stimulation of Semicircular Canals

907C0659C Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 24, No 2, May-Jun 90 (manuscript received 28 Apr 89) pp 40-43

[Article by A. V. Kondrachuk and S. P. Sirenko]

[Abstract] A mathematical model was designed for analysis of the caloric test for semicircular canal function, which relied on thermal expansion parameters and convection currents of the endolymph. Correlation of the mathematical predictions with actual experimental data showed, in general, good agreement between both sets of data. Accordingly, further studies shall be performed to assess the applicability of this type of mathematical modeling for diagnostic purposes. Figures 4; references 11: 4 Russian, 7 Western.

UDC 612.015+612.018].06:612.391].08

#### Hormonal and Metabolic Sequelae of Prolonged Fasting

907C0659D Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 24 No 2, May-Jun 90 (manuscript received 21 Feb 89) pp 47-50

[Article by V. S. Gorozhanin and V. V. Lobkov]

[Abstract] In view of the demonstration that fasting enhances tolerance of hypoxic situations, a systematic analysis was conducted on the effects of prolonged fasting with ad libitum access to water on hormonal and metabolic parameters. The study involved 14 healthy males, 25-39 years old, subjected to a 14 day fasting regimen accompanied by 40-60 min daily walks at 3-5 kg/h. The resultant changes in hormone, beta-endorphin, and metabolite levels demonstrated that the physiologic adjustment to fasting represented a finely coordinated

adjustment designed to maintain energy homeostasis. Accordingly, there was a metabolic shift to lipid metabolism in order to limit carbohydrate oxidation. The key mechanisms were found to involve adjustments in GABA and beta-endorphin mechanisms in the brain, prostaglandins, antioxidant mechanisms, and cholinergic and cAMP systems. The key features of survival in fasting, therefore, involve control of sympathetic mechanisms and the pituitary-adrenocortical axis to prevent life-threatening levels of energy expenditure. Tables 2; references 18: 12 Russian, 6 Western.

UDC 613.693:616.85-084

#### Neurotic and Psychosomatic Risk Factors in Flight Personnel

907C0659E Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 24 No 2, May-Jun 90 (manuscript received 7 Apr 88) pp 50-53

[Article by V. I. Yevdokimov]

[Abstract] Flight proficiency testing was combined with personality assessment test in order to ascertain health risk factors in the case of 121 pilots and trainees with neurotic and psychosomatic disorders. In that group, 16 pilots and 8 trainees were diagnosed with asthenic problems, while 34 pilots, 21 pilot trainees, and 42 allied flight personnel were determined to suffer from a variety of psychosomatic disorders. The fundamental findings led to the conclusion that individuals at risk exhibited inadequate mental adaptive potential, in contrast to 165 control subjects without such problems. This found manifestation in the form of asthenic tendencies and inclination toward nonconformation forms of behavior. Performance assessment and psychological testing has been shown useful in identifying such risk factors and may be used for determining occupational suitability. Figures 2; references 9: 7 Russian, 2 Western.

UDC 616.282.6-07:617.761-009.24

#### Nystagmus in Subjects with Asymmetric Changes in Otolithic Afferentation

907C0659F Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 24 No 2, May-Jun 90 (manuscript received 20 Apr 89) pp 53-56

[Article by Yu. K. Stolbkov and Ye. P. Maslova]

[Abstract] Studies on pigeons, demonstrating that asymmetric changes in otolithic afferentation result in dissociated nystagmus, led to studies on 23 patients with asymmetric changes in otolithic afferentation in order to assess the diagnostic utility of dissociated nystagmus. Studies in the dark with the centrifugal force (0.5 G) applied either in the occipital-frontal direction or the reverse led to the appearance of dissociated nystagmus.

Dissociated nystagmus was unrelated to the type of lesion and appeared with both increasing and diminishing centrifugal forces. Accordingly, these observations demonstrate that dissociated nystagmus may be used as a diagnostic indicator of asymmetric afferentation in the clinical setting and in determination of occupational fitness. Tables 2; references 9: 6 Russian, 3 Western.

UDC 616.1-008.1-092.9.02:612.014.477.064]-07

**Effects of 24 h Antiorthostasis on Systemic and Regional Hemodynamics in Wakeful Rats**

907C0660A Moscow BYULLETEN

EKSPERIMENTALNOY BIOLOGII I MEDITSINY  
in Russian Vol 109 No 1, Jan 90 (manuscript received  
20 Jun 89) pp 20-23

[Article by Ye. Yu. Bychkova, Ye. R. Martynova, O. S. Medvedev, V. P. Krotov, and F. Ye. Meyertsuk, Institute of Experimental Cardiology, All-Union Cardiological Scientific Center, USSR Academy of Medical Sciences; Institute of Biomedical Problems, USSR Ministry of Health, Moscow]

[Abstract] Antiorthostasis was employed in experimental studies on the effects of weightlessness on hemodynamics. Studies on 300-400 g male Wistar rats involved a 24 h period of antiorthostasis at an angle of 30° and determinations of blood flow rates with radiolabeled microspheres. The results showed that within two hours of commencement of antiorthostasis, blood pressure was elevated by 10 percent, heart rate by 5 percent, and total peripheral resistance by 15 percent. After 24 h the blood pressure was slightly depressed to below the baseline level, the heart rate showed a further increase to 10 percent, and total peripheral resistance was some 25 percent below normal. Analysis of regional hemodynamics demonstrated that after 2 h blood flow was depressed ( $p < 0.01$ ) in the stomach, pancreas, spleen, lungs, and the adrenal gland, and elevated in the testes. At the end of the experiment (24 h), depressed flow was seen in the spleen, liver, kidneys, and the adrenal glands, but elevated in the cerebellum. Blood flow in the testes remained elevated after 24 h, and was also increased in the left and right ventricles of the heart and the septum, whereas at 2 h a diminished blood flow had been observed. Figures 3; tables 1; references 7: 4 Russian, 3 Western.



UDC 578.085

**Cultivation of Individual Protoplasts and Plant Cells**

907C0618B Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR; SERIYA B—GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 3, Mar 90 (manuscript received 22 Sep 89) pp 63-65

[Article by I. V. Kirichenko, N. V. Kuchuk, L. A. Sakhno, and Yu. Yu. Gleba, Academician Ukrainian Academy of Sciences, Department of Cell Biology and Engineering, Institute of Botany, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Previously devised techniques were used to generate microcolonies in approximately 100 nliter droplets from rapeseed, soya, alfalfa, clover, cabbage, and pea protoplasts under single protoplast culture conditions. The highest plating efficiencies were obtained with soya (approximately 46 percent), pea (approximately 44 percent) and rapeseed (approximately 30 percent), and the lowest (2.5 percent) with clover. Figures 1; references 7: 1 Russian, 6 Western.

UDC 633.15:631.527/524.84/.86

**Hungarian Maize Varieties in Selection for Productiveness and Resistance to European Corn Borer**

907C0677A Moscow SELEKTSIYA I SEMENOVODSTVO in Russian No 2, Mar-Apr 90 pp 26-28

[Article by D. S. Pereverzev, Cand. Biol. Sci., A. S. Khromenko, Cand. Agri. Sci., and I. P. Chuchmiy, Doctor Agri. Sci.]

[Abstract] An analysis was conducted on 108 specimens of Hungarian maize to determine their suitability in selection for resistance against the European corn borer. The Hungarian specimens were chosen in view of the serious problem with the corn borer in that country, and the anticipation that resistant varieties would be identified. Trials in the forest-steppe zone of Ukraine led to the identification of specimens K-12669, K-17684, and K-17659 as being particularly promising, since they combine high resistance to the corn borer with resistance to corn smut and powdery mildew which are prevalent in Ukraine. In addition, the report includes data on pest resistance and typical harvests of the other specimens as well. Tables 1.



UDC 577.113.6:542.95

**Novel Method of Synthesizing  
Oligodeoxyribonucleotides Based on Oxidative  
Phosphorylation**

907C0627C Moscow BIOORGANICHESKAYA

*KHIMIYA in Russian Vol 16 No 1, Jan 90 (manuscript  
received 6 Apr 89) pp 121-123*

[Article by S. M. Gryaznov and V. K. Potapov, All-  
Union Institute of Biotechnology, Ministry of the Med-  
ical Microbiology Industry, Moscow]

[Abstract] A novel approach to the synthesis of oligodeoxyribonucleotides was devised based on oxidative phosphorylation for the formation of internucleotide bonds in the solid-phase triester method. The method involved three phases consisting of: a) internucleotide condensation between  $I_2$ -activated nucleoside 3'-O-methylhydrophosphite and 5'-hydroxyl group on a carrier-bound nucleoside, b) acetylation (capping) of unreacted 5'-hydroxyl groups, and c) detritilation. A distinguishing aspect of this method is the simultaneous formation of internucleotide bonds and oxidation. After purification the yield of the final product is usually about 11 percent. Figures 1; tables 1; references 7: 3 Russian, 4 Western.

UDC 577.175.322

**Expression of Human Growth Hormone in Transplantable Mouse Fibroblasts**

907C0531D Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 23 No 6, Nov-Dec 89 pp 1692-1699

[Article by M. V. Reznikov, R. Fidler, P. M. Rubtsov et al.; Institute of Molecular Biology imeni V. A. Engelhardt, USSR Academy of Sciences]

[Abstract] Production of transplantable lines of mammal cells stably producing human growth hormone with the use of recombinant retrovirus particles for transfer of the somatotropin precursor gene into the target cell was described and discussed. A system of retrovirus vectors of the rPS-neo family, which imparts resistance to antibiotic G-418, was developed for transfer and expression of allogenic genes in mammal cells. They were used to obtain BALB/c mouse lines which produced more than 7 µg per ml, in a culture medium, of human growth hormone. An immunosorbent made it possible to remove the growth hormone from the cell culture medium. The possibility of use of the producer cells for gene therapy was discussed. Figures 5; references 11: 5 Russian; 6 Western.

UDC 576.8.95:663.1

**Random Mutagenesis of Isolated DNA in Biotechnology**

907C0637A Moscow BIOTEKHNOLOGIYA in Russian No 1, Jan-Feb 90 (manuscript received 19 Aug 87) pp 3-8

[Article by O. K. Shulyupin and I. I. Fodor\*, All-Union Scientific Research Institute of Applied Microbiology, Obolensk, Moscow Oblast; \*Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] A review of Soviet and Western literature on in vitro mutagenesis shows that this is an approach assuming increasing importance in biotechnology. A key advantage of this approach is that it allows for induced point mutations in genes cloned in plasmids with greater ease than site-directed mutations in source organisms. In the case of plasmid studies, some of the most useful chemical mutagens have been shown to be hydroxylamine, nitrous acid, and sodium bisulfite. Considering accessibility, stability, spectrum of action, and toxicity, the agent of choice appears to be nitrous acid. For example, in the case of plasmid ColEI nitrous acid has been shown to induce mutations with a frequency of  $40 \cdot 10^{-4}$ . In vitro mutagenesis has obvious applications in the construction of viral and bacterial vaccines and industrial bacteria, and has obvious utility in situations where the primary structure of the protein product has

not been determined and site-directed mutagenesis is not practical. Tables 1; references 69: 16 Russian, 53 Western.

UDC 577.152.314.14

**Determination of DNA Cleavage Sites by Restriction Endonucleases**

907C0637B Moscow BIOTEKHNOLOGIYA in Russian No 1, Jan-Feb 90 (manuscript received 22 Mar 89) pp 12-16

[Article by G. G. Prikhodko, S. Kh. Degtyarev, N. I. Rechkunova, S. V. Sosnovtsev, and V. Ye. Chizhikov, All-Union Scientific Research Institute of Molecular Biology, "Vektor" Scientific Industrial Association, Koltsovo, Novosibirsk Oblast]

[Abstract] Cursory details are presented on the technical steps involved in the construction of plasmids, designated pUBS18 and pUBS19, bearing target sites for the restriction endonucleases Bse21I, DraI, and BimI which produce large DNA fragments. Rapid sequencing was possible by labeling one of the ends resulting from Bse21I action with TTP and  $\alpha$ - $^{32}$ P-dCTP. The results showed that BimI, isolated from *Brevibacterium immotum*, recognizes the site TT-CGAA. Figures 4; tables 1; references 11: 3 Russian, 8 Western.

UDC 663.143.033

**Physiological, Biochemical, and Insecticidal Properties of *Bacillus Thuringiensis* var. *israelensis***

907C0637C Moscow BIOTEKHNOLOGIYA in Russian No 1, Jan-Feb 90 (manuscript received 25 Jun 87) pp 21-24

[Article by V. N. Trofimenkov, V. I. Orlovskiy, T. P. Dubinina, and S. P. Rasnitsyn, All-Union Scientific Research Institute of Biotechnology, Moscow]

[Abstract] Multiple passages on semiliquid meat peptone agar with 0.5 percent Tween-80 and thermal treatment were used to select a *Bacillus thuringiensis* var. *israelensis* 14 A1 strain that exhibited enhanced sporogenesis and crystal production on a yeast-polysaccharide medium. After 17-18 h of growth on meat peptone broth 98-100 percent spore formation was observed, versus 70-75 percent for the parental strain. Studies on alkaline extracts of the endotoxin yielded two major components with molecular weights of 25,000 and 45,000 D, and a minor 140,000 D fraction. Only the 25,000 D component was found to be toxic to larvae of *Culex* and *Aedes* mosquitoes. Figures 2; tables 1; references 39: 9 Russian, 30 Western.

UDC 577.2:577.112

**Regulating Expression of Human Interleukin-2 Gene in *Escherichia coli* and *Pseudomonas putida* Cells***907C0637D Moscow BIOTEKHNOLOGIYA in Russian No 1, Jan-Feb 90 (manuscript received 19 Aug 87) pp 26-28*

[Article by S. V. Kostrov, Ye. A. Nosovskaya, A. Yu. Chistoserdiv, N. V. Protasova, Yu. D. Tsygankov, R. A. Arsatyants, V. E. Sterkin, and A. Ya. Strongin, All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow]

[Abstract] A comparative analysis was conducted on the heat-regulated expression of the human interleukin-2 (IL-2) gene in *Escherichia coli* C600 and *Pseudomonas putida* PpG6 using the recombinant plasmid pPR-IL-2. The latter plasmid consists of a plasmid RSF 1010 replicon, IL-2 gene under the control of phage  $\lambda$  promoter  $P_{\lambda}$ , and phage  $\lambda$  heat-sensitive repressor  $cl_{857}$  under the control of the pPR-IL-2 promoter. Solid phase immunoassays demonstrated that at 28°C transformed *E. coli* failed to produce IL-2. However, at 42°C IL-2 was produced 25-30 min after induction, reaching a maximum concentration of  $4 \cdot 10^3$  LU/L after 3 h at  $D_{590} = 2.5$ . Analogous results were obtained with *Ps. putida*. The IL-2 gene was not expressed at 28°C, but synthesis commenced at 42°C 40-50 min after thermal induction. Maximum concentration of IL-2 was approximately  $4 \cdot 10^4$  LU/L after 2.5-3 h at  $D_{590} = 2.5$ . Comparison of viability plots for control and recombinant cultures at the two temperatures showed that IL-2 was toxic for *E. coli* but not for *Ps. putida*. Figures 6; references 14: 4 Russian, 10 Western.

UDC 577.156

**Immobilization of Papaya Proteinase Complex by Synthetic Polymers: Study of Enzyme Preparation Degradation***907C0637E Moscow BIOTEKHNOLOGIYA in Russian No 1, Jan-Feb 90 (manuscript received 2 Jul 87) pp 29-32*

[Article by A. V. Maksimenko, L. A. Nadirashvili\*, V. V. Abramova, G. S. Yerkomaishvili\*, R. D. Katsarava\*, and V. P. Torchilin, Institute of Experimental Cardiology, All-Union Cardiological Research Center, USSR Academy of Medical Sciences, Moscow; \*Institute of Pharmacochimistry imeni I. R. Kutateladze, Georgian SSR Academy of Sciences, Tbilisi]

[Abstract] A comparative analysis was conducted on papaya proteinase complex (PPC) covalently immobilized on 50-60 kD polyamide and 45-50 kD polyurethane. In all cases, immobilization resulted in 90 percent protein binding. However, immobilization in the presence of cysteine increased retention of enzymatic activity to 70 percent, whereas in the absence of cysteine

the PPC-polyamide showed only 50 percent of the original activity and the PPC-polyurethane demonstrated 20 percent activity. The efficacy of cysteine was attributed to reactivation of reversibly inactivated PPC in the course of immobilization. Immobilization had no significant effect on catalytic parameters, however the pH optimum was shifted to 6.8-7.5 for immobilized PPC versus 6.5-7.0 for soluble PPC. At pH 7.4 the immobilized preparations were relatively stable, but at pH 9.6 they were highly susceptible to degradation by pronase and subtilysine in the following sequence: soluble PPC < PPC-polyurethane < PPC-polyamide. In addition, cysteine was also found to enhance thermal stability at 37°C. Finally, immobilized PPC could be precipitated at an acid pH without appreciable loss of enzymatic activity, providing thereby an easy means of its recovery from reaction mixtures. The relatively low solubility of immobilized PPC would appear to limit its clinical applications to topical use. Figures 3; tables 1; references 12: 9 Russian, 3 Western.

UDC 663.14.012.3

**Development of Leak-Proof Drives for Bioreactors***907C0637F Moscow BIOTEKHNOLOGIYA in Russian No 1, Jan-Feb 90 (manuscript received 25 Nov 88) pp 46-48*

[Article by A. N. Alekseyev and G. P. Ilin, Leningrad Wood Technology Academy imeni S. M. Kirov]

[Abstract] Several drives for bioreactors have been developed at the academy, with current experimental data indicating that magnetic drives with shielded coupling devices constitute the most promising approach. The latter are characterized by relatively small size and reliability when permanent ferromagnetic-rare earth element magnets are utilized. A schematic shows the arrangement of the three key elements—driving coupling, driven coupling, and shield—in an asynchronous magnetic drive. In addition, a prototype has been developed that is capable of operation at 1500° under a pressure of 10 atm with 40 kgm torque load. Trials have indicated that such drives have a useful lifetime in excess of ten years. Figures 3; references 9 (Russian).

UDC 577.156

**Stability of Native and Immobilized Papaya Protein Complexes in Various Conditions***907C0637G Moscow BIOTEKHNOLOGIYA in Russian No 1, Jan-Feb 90 (manuscript received 2 Jul 87) pp 56-60*

[Article by A. V. Maksimenko, L. A. Nadirashvili, V. V. Abramova, G. S. Yerkomaishvili, and V. P. Torchilin, Institute of Experimental Cardiology, All-Union Cardiological Scientific Center, USSR Academy of Sciences, Moscow; Institute of Pharmacochimistry imeni I. R. Kutateladze, Georgian SSR Academy of Sciences, Tbilisi]

[Abstract] Comparative stability studies were performed on soluble PPC and PPC immobilized on aldehyde dextran-cysteine (imPPC), employing the 70-75 kD fraction of the latter. Studies over a pH range of 3.0 to 9.6 demonstrated soluble PPC and imPPC to be relatively stable. Soluble PPC was subject to a greater degree of degradation at pH 9.6 than imPPC, whereas at pH 3.0 the reverse was true. In addition, at pH 7.4 soluble PPC formed 40-50 kD aggregates, a process that is prevented by iodoacetate treatment and attributed to thiol-disulfide interactions. imPPC was also shown to be less susceptible to inactivation at 37°C than soluble PPC, and neither was susceptible to attack by trypsin or chymotrypsin over a wide pH range. Inactivation by pronase was inhibited by addition dithioerythritol or copper sulfate, the latter compounds also preventing association of soluble PPC at pH 7.4. These observations demonstrated that imPPC may find clinical applications in view of its greater stability and prolonged action. Figures 4; references 20: 9 Russian, 11 Western.

UDC 547.963.32.07

**Control of Cloned Gene Expression by Temperature-Sensitive Replicon Plasmid Utilizing Phage Lambda Promoters  $p_L$  and  $p_R$**

907C0639A Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 90 (manuscript received 11 Aug 87) pp 7-10

[Article by L. A. Zheleznyaya and D. V. Styaponavichute, Institute of Biophysics, USSR Academy of Sciences, Pushchino, Moscow Oblast; I. N. Troyanovskaya, Branch of the Institute of Bioorganic Chemistry, Pushchino; and N. I. Matviyenko, Protein Institute, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] Details are presented on the construction of a temperature-sensitive plasmid, designated pHSG415-Clts, bearing the lambda phage gene for the thermosensitive repressor, Clts, and the origin of replication derived from plasmid pSC101. pHSG415-Clts, accordingly, is compatible with pBR322 and its derivatives. In addition, at 28-30°C pHSG415-Clts is present in *Escherichia coli* in a small copy number, thereby precluding overproduction of the repressor. At 30°C pHSG415-Clts is stable within *E. coli* DH2 cells, but is eliminated at 37 and 43°C. Introduction of the compatible plasmid pCJ55 encoding the Klenow fragment of *E. coli* DNA-polymerase facilitated testing of the ability of pHSG415-Clts to control genes under the control of promoters  $p_L$  and  $p_R$  of phage lambda on compatible plasmids. Induction of the Klenow fragment proceeded as efficiently at 43 as at 37°C, with the Klenow fragment representing 25 percent of the total soluble protein in the cell. High Klenow fragment production was attributed to two mechanisms: repressor inactivation and plasmid elimination. Consequently, pHSG415-Clts offers an alternative to defective lysogenic phages for control of expression of cloned genes under early promoters of phage lambda. Figures 4; references 17: 3 Russian, 14 Western.

UDC 663.14.031

**Float-Immobilization of Yeasts: Novel Approach to Development of Biocatalysts**

907C0639B Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 90 (manuscript received 13 Jan 88) pp 29-31

[Article by T. I. Bogacheva, Ye. V. Mikhaleva, O. P. Gorbunova, Ye. F. Panarin, and A. I. Sizov, All-Union Scientific Research Institute of Plant Material Digestion, Leningrad; Institute of High Molecular Weight Compounds, USSR Academy of Sciences, Leningrad]

[Abstract] Experiments were conducted to test the feasibility of float immobilization of *Candida scottii* KC-2 and *Saccharomyces cerevisiae*, employing the cationic copolymer vinylpyrrolidone:vinylamine (52:48), 80,000 MW, as the flocculant. Introduction of the anionic surfactant SDS [as published] greatly increased flotation of both yeasts as a result of hydrophobization of the cell surface in a flow-through reactor. Furthermore, float immobilization at the gas-liquid interphase had no adverse effect on the cell viability of *S. cerevisiae*. In the case of *C. scottii* the lag-phase was markedly extended, following which the growth rate and the final biomass yield were on par with control cultures. Nevertheless, the expectation is that the metabolic characteristics of the cells will be modified by the immobilization procedures. Figures 4; references 8: 6 Russian, 2 Western.

UDC 547.995.17

**Covalent Immobilization of Luminescent Bacteria *Photobacterium fischeri***

907C0639C Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 90 (manuscript received 27 Aug 87) pp 31-34

[Article by A. V. Usova\*\*, V. V. Chupov\*\*, Yu. A. Malkov\*\*, V. S. Danilov\*\*, L. I. Valuyev\*, and N. A. Plate\*, \*Institute of Petrochemical Synthesis, USSR Academy of Sciences, Moscow; \*\*Moscow State University imeni M. V. Lomonosov]

[Abstract] Numerous studies were conducted on the preparation of covalently immobilized preparations of *Photobacterium fischeri* with retention of luminescence. The results of various immobilization trials showed that low molecular weight agents used in coupling the cells to polymeric supports often had an adverse effect on luciferase, precluding analytical use of *P. fischeri* even when full viability was otherwise retained. However, immobilization with retention of desirable functional characteristics was possible on activated water-soluble polymeric supports bearing functional groups, i.e., in cases when activation of the cell surface was unnecessary. Further improvements were introduced by the use of water-insoluble polymers bearing -COCl groups. In the case of methacryloyl chloride films, gamma irradiation in a dose of 2 Mrads led to immobilization of



92.1·10<sup>6</sup> cells per cm<sup>2</sup>, with the half-time for quenching increasing four- to five-fold in comparison with a control suspension of free cells. Figures 3; tables 1; references 14: 12 Russian, 2 Western.

UDC 57.086.83

#### **Raji Lymphoid Cells Selected for Growth on Bovine Serum Medium**

907C0639D Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 90 (manuscript received 17 Dec 87) pp 39-40

[Article by A. A. Narimanov and B. K. Gavriluk, Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] Studies were conducted on selection of a human line of Raji lymphoid cells originally derived from Burkitt's lymphoma for growth on media supplemented with bovine serum rather than expensive embryonal serum. The experimental approach consisted of growing the cells in a mixture of DMEM [as published] (Serva, FRG) and Eagle's medium (1:1 originally), with 5 percent embryonal serum and 20 percent bovine serum. Every 3-4 cell passages (12-14 days) the concentration of embryonal serum and DMEM was decreased by 1 percent. After 3 months the cell line was found to grow on Eagle's medium with 20 percent bovine serum. Replicative activity of the cells attained control levels after 5 passages on the new medium and remained at that plateau for the 14 passages of observation. Considering that one cell passage corresponds to 3 generations, the data indicate that the growth rate became constant after 15 generations. Raji cells grown in the bovine serum medium responded in a manner analogous to the control Raji cells to 1,4-naphthoquinone and 2.5-10 Gy gamma irradiation. Figures 3; tables 1; references 10: 3 Russian, 7 Western.

UDC 577.150.2

#### **Immobilization of Alkylbenzenesulfonate-Degrading Pseudomonas Alcaligenes TR on Synthetic Fibers**

907C0639E Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 90 (manuscript received 3 Dec 87) pp 53-56

[Article by G. N. Nikovskaya, P. I. Gvozdyak, I. I. Shamolina, S. S. Stavskaya, and A. B. Lobova, Institute of Colloid Chemistry and Water Chemistry imeni A. V. Dumanskiy, Ukrainian SSR Academy of Sciences, Kiev; Leningrad Institute of the Textile and Light Industry imeni S. M. Kirov]

[Abstract] Trials were conducted on the immobilization of *Pseudomonas alcaligenes* TR, an alkylbenzenesulfonate-degrading bacterium, on chemically-modified synthetic fibers with the purpose of utilizing the immobilized bacteria in water treatment. Results with several fibers demonstrated that optimum immobilization was

obtained with polyvinyl alcohol fibers modified to bear carbonyl and amine groups. Binding of the cells to the carrier involved physical factors as well as chemosorption, with the latter accounting for immobilization of 15 mg of *Ps. alcaligenes* TR per 1 g of carrier. Polyvinyl alcohol and polycapraamide fibers with fewer carbonyl, amine, and carboxyl groups were less efficient in immobilization of the bacterial cells. In addition, the immobilized bacterial preparations were far more efficient than free cells and the fibers in alkylbenzenesulfonate degradation. Figures 2; tables 1; references 13: 9 Russian, 4 Western.

UDC 577.156

#### **Chemical Stabilization of Papaya Proteinase Complex and Comparison With Native Complex**

907C0639F Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 90 (manuscript received 2 Jul 87) pp 57-60

[Article by A. V. Maksimenko\*, L. A. Nadirashvili\*\*, A. D. Romashchenko\*\*\*, G. S. Yerkomaishvili\*\*, and V. P. Torchilin\*, \*Institute of Experimental Cardiology, All-Union Cardiological Scientific Center, USSR Academy of Medical Sciences, Moscow; \*\*Institute of Pharmacology chemistry imeni I. R. Kutateladze, Georgian SSR Academy of Sciences, Tbilisi; \*\*\*Scientific Research Institute of Eye Diseases imeni Gelmgolts, RSFSR Ministry of Health, Moscow]

[Abstract] Co-immobilization of a proteinase complex derived from papaya with cysteine on periodate-treated dextran (dextran aldehyde) resulted in binding of about 90 percent of the protein to the carrier. Significantly, 60-70 percent of the initial esterase activity was retained when tested with  $\alpha$ -N-benzoyl-L-arginine ethyl ester as the substrate. In the absence of cysteine only 10-15 percent of the initial enzymatic activity was retained. Gel chromatography and electrophoresis with SDS [as published] demonstrated that the immobilized complex consisted of a 60-80 kD entity. The immobilized complex evidenced acceptable activity over a pH range of 6.0 to approximately 8.0. Ocular films were prepared containing soluble or immobilized PPC to test their therapeutic effect on hyphemia and hemophthalmia in rabbits. Gradual degradation of the polymer film releases the medicine, with improvement noted by the third day of treatment. Further medical study of PPC is recommended. Figures 3; tables 1; references 17: 9 Russian, 8 Western.

UDC 577.151.02

#### **Thiocapsa Roseopersicina Hydrogenase-Catalyzed Hydrogen Isotope Exchange in H<sub>2</sub>-H<sub>2</sub>O System**

907C0639G Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 90 (manuscript received 29 Jul 87) pp 60-66

[Article by A. S. Lobach and N. A. Zorin, Chernogolovka Department of the Institute of Chemical Physics,



Moscow Oblast, and the Institute of Soil Science and Photosynthesis, Pushchino, Moscow Oblast, USSR Academy of Sciences]

[Abstract] Homogenized and immobilized hydrogenase preparations from *Thiocapsa roseopersicina* were tested for efficiency in hydrogen isotope exchange in a  $H_2$ - $H_2O$  system employing tritium (T). The specific activity of the homogenized enzyme was 16  $\mu$ moles HT/mg protein/min ( $T = 303$  K,  $P_{H_2} = 1$  atm), which increased three-fold to 49  $\mu$ moles HT/mg protein/min upon addition of methyl viologen (paraquat). The activation energy over the temperature range of 303-343 K was calculated at 9 kcal/mole. The hydrogenase retained activity over 303-353 K, but was rapidly inactivated at 363 K. Finally, activity of the homogenized enzyme was stable over a pH range of 6 to 7.5. Immobilization of the enzyme on phenyl-Sepharose CL-4B resulted in a 5-16 percent loss of activity, while on DEAE-cellulose DE52 a loss of 21-25 percent was observed. Although addition of sodium azide greatly improved stability, marked loss of activity was seen after 20-30 h, following which the rate of activity decline slowed by an order of magnitude. After 360 h only 20-30 percent of the initial activity was detected. Irradiation from tritium had no effect on hydrogenase activity. Comparison with the activities of electrodes prepared from noble metals demonstrated that about 36 mg of the hydrogenase was equivalent in

activity to 1 mg of Pt, and 4 mg of the enzyme to 1 mg of Rh. Figures 4; tables 5; references 21: 11 Russian, 10 Western.

UDC 636.087.74

#### Efficiency of Lower Alcohol Utilization in Single Cell Protein Production

907C0639H Moscow BIOTEKHNOLOGIYA in Russian No 2, Mar-Apr 90 (manuscript received 4 Nov 87) pp 77-80

[Article by A. D. Satrutdinov and V. K. Yeroshin, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] Cost effectiveness of single cell protein production was assessed for methanol- and ethanol-utilizing yeasts and methanol-utilizing bacteria. The results demonstrated that in the economic sense methanol-utilizing bacteria and ethanol-utilizing yeasts are approximately equivalent, though ethanol-utilizing yeasts offer 24 percent higher single cell protein production while requiring 20 percent less substrate than methanol-utilizing bacteria. Considering the relative costs of methanol and ethanol, it appears that at current prices production of single cell protein by the methanol-bacteria system should have a 5 percent advantage over the ethanol-yeast system. Figures 3; tables 2; references 12: 9 Russian, 3 Western.

UDC 616.98:579.887.9]-036.2-07(479.22-25)

**Legionellosis in Tbilisi***907C0646C Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 1, Jan 90 (manuscript received 8 Feb 89) pp 42-45*

[Article by L. A. Sakvarelidze, V. A. Nersesov, G. Yu. Mgeladze, P. S. Gamtsemlidze, and N. O. Barnabishvili, Georgian Anti plague Station, USSR Ministry of Health, Tbilisi]

[Abstract] Epidemiologic, clinical, and serologic studies were conducted on an outbreak of legionellosis in Tbilisi in July and August 1988, affecting 104 workers at two plants in connection with a newly installed air conditioning system. The data showed that the incubation period ranged from several hours to 8-10 days and in 60-70 percent of the cases the initial symptomatology consisted of chills. Other recorded symptoms were weakness (8 percent), elevated temperature (38-38.5°C; 14 percent), headache (18-20 percent), nausea (9 percent), abdominal pain (4 percent), and gastrointestinal disturbances (12 percent). Virtually all patients developed cutaneous eruptions which, in 20 percent of the cases, were preceded by vesicles. The eruptions resolved after 3-5 days leaving pale-brown spots that disappeared within a month. In 35 percent of the patients recurrence of eruptions occurred with the same sequelae. These observations suggest a novel form of legionellosis that has been designated legionella fever. References 2 (Russian).

UDC 616.24-006.6:313.13(575.2)

**Lung Cancer Incidence in Kirghizia in 1968-1987 and Prognosis for Year 2000***907C0679A Leningrad VOPROSY ONKOLOGII in Russian Vol 36 No 2, Feb 90 (manuscript received 22 Feb 89) pp 158-162*

[Article by R. Azykbekov and A. M. Zaytsev, Kirghiz Scientific Research Institute of Oncology and Radiology, Kirghiz SSR Ministry of Health, Frunze]

[Abstract] Epidemiologic data on lung cancer in Kirghizia at the Kirghiz Institute of Oncology were analyzed for the years 1968-1987. The study demonstrated that the incidence ranged from 9.3 to 14.7 per 100,000 individuals, with an average of 11.9 per 100,000. The incidence in men was five times greater than in women, and twice as great in urban areas as in rural areas. In addition, incidence of lung cancer in Kirghizia was the highest among the Central Asian republics. Nevertheless, the urban incidence in Kirghizia was two-fold lower than the urban incidence in the USSR as a whole, and the

rural incidence four-fold lower. The prognosis of lung cancer for the year 2000 is an incidence of 18.5 per 100,000. Figures 1; tables 2; references 15: 9 Russian, 6 Western.

UDC 616.24-006.6:614.7

**Environmental Factors in Urban Lung Cancer Morbidity in Major Cities of USSR***907C0679B Kiev EKSPERIMENTALNAYA ONKOLOGIYA in Russian Vol 12 No 2, Mar-Apr 90 (manuscript received 3 Apr 89) pp 26-29*

[Article by G. M. Zemlyanaya and D. G. Zaridze, Scientific Research Institute of Carcinogenesis, All-Union Oncological Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] Air pollution and tobacco use were related to the lung cancer morbidity in 26 major Soviet cities, based on epidemiologic data collected in the years 1979-1983. The correlation between air pollutants (SO<sub>2</sub>, CO, NO<sub>2</sub>) and lung cancer was strong in men ( $r = 0.64$ ;  $P = 0.001$ ), but weaker in women ( $r = 0.38$ ;  $P = 0.06$ ). The correlation between tobacco use and lung cancer was equally high and strong in men ( $r = 0.72$ ;  $P = 0.02$ ) and women ( $r = 0.73$ ;  $P = 0.01$ ). These findings indicate that smoking and other forms of tobacco abuse constitute a more serious health risk factor in terms of lung cancer than air pollution. References 9: 4 Russian, 5 Western.

UDC 576.895.421+591.09

**Concurrent Infection of Ixodes Persulcatus Ticks With Lyme Disease and Tick-Borne Encephalitis Agents***907C0679C Leningrad PARAZITOLOGIYA in Russian Vol 24 No 2, Mar-Apr 90 (manuscript received 16 Mar 89) pp 102-105*

[Article by E. I. Korenberg, S. V. Shcherbakov, G. G. Bannova, M. L. Levin, and A. S. Karavanov, Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya and Institute of Poliomyelitis and Viral Encephalitis, USSR Academy of Medical Sciences]

[Abstract] Bacteriologic and virologic examinations were conducted on 985 adult Ixodes persulcatus ticks collected 15-20 km from Khabarovsk to assess the possibility of mixed infections with the Lyme disease agent and tick-borne encephalitis virus. The results demonstrated that 0.5 percent of the ticks were concurrently infected with both agents. In the majority of ticks the viral titers were on the order of 2 log PFU/ml, although in two ticks the titers reached 7.0 and 7.4 log PFU/ml. Tables 1; references 18: 14 Russian, 4 Western.

UDC 616.36-002.1-036.17-085.373:578.245

**Leukinteron in Treatment of Severe Forms of Acute Hepatitis B**

907C0513C Moscow TERAPEVTICHESKIY ARKHIV in Russian Vol 61 No 11, Nov 89 pp 50-54

[Article by E. Sh. Botsvadze, V. P. Kuznetsov and Sh. Sh. Gogichayshvili; Tbilisi Medical Institute]

[Abstract] A study of the therapeutic effectiveness of inexpensive leukinteron in treatment of grave forms of hepatitis B involved observation of 91 patients in grave condition. Group 1 (45 persons) received leukinteron and group 2 (42 persons) received a placebo. Both groups were of comparable age. Placement in the groups was random except for 4 persons with signs of acute hepatic encephalopathy I-II degree, all of whom were treated with leukinteron. All patients received generally accepted therapy with the experimental group receiving leukinteron and the other group receiving a placebo. Effectiveness of interferon therapy was assessed by clinical, biochemical and serological criteria and by the immunoenzymic reaction of the leukocytes. Leukinteron was injected intramuscularly the 1st 2-3 days in a dose of  $1 \times 10^4$ - $2 \times 10^4$  effective dose once every 8 hours followed by a single injection for 5-12 days when the patient improved. Patients with signs of acute hepatic encephalopathy began treatment with a 3-fold intravenous infusion each 8 hours and then received intramuscular injection. Treatment of severe, acute hepatitis B with leukinteron decreased the intoxication syndrome, improved biochemical indicators, promoted positive serological dynamics and provided savings by reducing

the length of hospitalization. Leukinteron is much cheaper than highly concentrated interferon preparations. The findings justified the recommendation of the use of leukinteron for practical purposes. References 21; 8 Russian; 13 Western.

UDC 616.98:579.861.2]-092.9-085.275-036.8-07

**Effects of Synthetic Regulatory Opioid Peptide Dalargin on Staphylococcus Aureus and Its  $\alpha$ -Toxin in Mice**

907C0646D Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 1, Jan 90 (manuscript received 12 Nov 88) pp 103-104

[Article by C. B. Pashutin and T. D. Samykina, Institute of Surgery imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences, Moscow]

[Abstract] Experimental therapeutic trials with dalargin, a synthetic analog of leu-enkephalin, were conducted on 18-20 g outbred male mice challenged either with staphylococcal  $\alpha$ -toxin or the bacterial cells. A two-fold increase in the survival rate was obtained when the animals were treated intraperitoneally with 100  $\mu$ g/kg of dalargin after intraperitoneal administration of 0.25 Lh/ml of the toxin. Similarly, the same dosage and route of dalargin given to animals 3 h after intraperitoneal injection of  $10^{10}$  S. aureus cells increased the 7 day survival rate to 55 percent in comparison with a 20 percent control survival rate. The beneficial effects of dalargin were attributed to its systemic effects and, in particular, alleviation of stress on the reticuloendothelial system.

UDC 591.484.62:599.745

**Nerve Endings in Retina of Caspian Seal***907C0488 Kiev VESTNIK ZOOLOGII in Russian  
No 6, Nov-Dec 89 pp 64-66*

[Article by G. I. Vasilevskaya; Institute of Zoology imeni  
I. I. Shmalgauzen, UkSSR Academy of Sciences, Kiev]

[Abstract] The seal eye is of considerable interest because of the seal's capacity to see objects not only in the water or air but also in the air but viewed from the water. The seal's eyes function during drops of temperature, pressure and some other physical and chemical environmental changes. These and other factors

prompted this study of the nervous apparatus of the seal retina. Discussion of the anatomy and physiology of the Caspian seal's retina included illustrations and description of the subepithelial nerve plexus, nerve fibers in the surface layers of natural substance of the retina and innervation of the subepithelial layer of the retina and the epithelium. The Caspian seal's basic food is fish and it lives most of its life on the ice cover of the north of the Caspian Sea so the eye structure is well adapted to conditions requiring persistent regulation of trophic processes and fast reactions. The highly developed innervation of the seal retina indicates the high reactivity of the eye but the degree of its sensitivity and the capacity to differentiate stimuli remains unexplained. Figures 3; references 7: 3 Russian; 4 Western.

UDC 616.98:578.826.6]-092:612.017.1.064]-084

**Results of Clinical and Hematological Examination of Blood Donors Infected With HIV-virus**

907C0513A Moscow TERAPEVTICHESKIY ARKHIV  
in Russian Vol 61 No 11, Nov 89 pp 34-36

[Article by N. N. Tsyba, R. A. Lema, M. P. V. Mmari and Ch. Makoye; Department of Internal Diseases No. 2 (head-professor V. V. Sinyachenko), Donetsk Medical Institute, Department of Hematology and Blood Transfusion (head-professor R. A. Lema), Mukhimbili Hospital, Dar-es-Salam]

[Abstract] AIDS patients display thrombocytopenia, leukopenia and lymphopenia and disturbances in various links of immunity. A study of the peripheral blood and of myelograms and proteinograms of blood donors, infected by HIV, in whom antibodies to HIV were found before regular blood drawing (i.e. infected persons without signs of AIDS), was described and discussed. From September 1987 to February 1988, 30 blood donors infected with HIV were detected and examined at the Department of Hematology and Blood Transfusion of Mukhimbili Hospital in Dar-es-Salam, Tanzania. Examinations of the blood donors included a questionnaire, peripheral blood study, bone marrow puncture and a proteinogram. Healthy persons (30) of the same age as the 30 infected males (average age 24 years) including 16 married men, served as the control group. Some deviations in myelogram indicators, peripheral blood and proteinograms of the infected donors appeared. Dynamic observation of such a group should include special attention to decreasing the number of thrombocytes, leukocytes and lymphocytes and to increasing the erythrocyte sedimentation rate. Monitoring of the proteinogram indicators was recommended with special attention being given to the albumin level and gamma globulin level in the blood. During prolonged observation of persons infected with HIV, counting the number of atypical lymphocytes in the peripheral blood may help to determine the probable time of infection. Determination of the degree of change of these indicators as compared to the control can help to diagnose a qualitatively new state in the patients, transformation of HIV infection into AIDS. References 18 (Western).

UDC 616.98:578.828.6]-092:612.017.1.064]-036.88

**Case of Death From AIDS in USSR**

907C0513B Moscow TERAPEVTICHESKIY ARKHIV  
in Russian Vol 61 No 11, Nov 89 pp 34-36

[Article by A. G. Rakhmanova, V. A. Isakov, A. A. Koshelev et al.; Institute For Advanced Training of Physicians imeni S. M. Kirov, GUVH Hospital, Leningrad]

[Abstract] A discussion of the first case of death of a USSR citizen from AIDS included a case history of the disease. The patient, 29 years old, lived in Leningrad and

was examined at one of the polyclinics in the city. Reports after her death indicated that she had had numerous sexual contacts with foreigners, including Africans. She displayed many symptoms found in AIDS victims. In spite of negative results from blood studies, the presence of unusual clinical signs and long-lasting, diffuse candidiasis prompted a probable diagnosis of AIDS. Further blood tests were performed after death because of the lightning course of the disease. Immunoenzymic tests and immunoblotting tests revealed antibodies to HIV. Clinical, epidemiological and autopsy data, results of blood and immunological studies confirmed the diagnosis of the pulmonary form of AIDS, revealing pneumocystic pneumonia, diffuse candidiasis of the mouth, upper respiratory tract, bronchi and esophagus. The clinical signs of AIDS were caused by opportunistic infections and included diffuse candidiasis of the gastro-intestinal tract and respiratory organs and very grave pneumocystic pneumonia and progressive cardio-pulmonary insufficiency. The years of work in Leningrad revealed not only foreigners but also a Soviet citizen with HIV infection. The seropositive group included persons having casual sexual relations with foreigners, homosexuals, persons with venereal disease, blood donors, pregnant women and a 5-year old child. This indicates a spread of HIV among the Leningrad population. This obligates physicians of all specialties and other medical workers to increase caution in relation to HIV, to help improve, in every possible way, therapeutic and diagnostic assistance to persons infected with HIV, AIDS patients and persons with AIDS-marker diseases. Figure 1; references 13: 5 Russian; 8 Western.

UDC 57.034:612.43:532.758.695.2

**Tensodilatometry of Cooling Solutions for Cryopreservatives and Tissues**

907C0618D Kiev DOKLADY AKADEMII NAUK  
UKRAINSKOY SSR: SERIYA  
B—GEOLOGICHESKIYE, KHIMICHESKIYE I  
BIOLOGICHESKIYE NAUKI in Russian No 3, Mar 90  
(manuscript received 7 Jul 89) pp 74-78

[Article by N. S. Pushkar, Corresponding Member Ukrainian Academy of Sciences, A. I. Osetskii, V. I. Anenko, and B. I. Makarenko, Institute of Cryobiological and Cryomedical Research, Ukrainian SSR Academy of Sciences, Kharkov]

[Abstract] Tensodilatometric studies were conducted to determine the preincubation conditions of thyroid gland with 10 percent dimethylsulfoxide or 30 percent polyethylene oxide-1500 for optimum cryopreservation. The experimental results demonstrated that the optimum preincubation time was about 40 min. Employing this approach, cryopreservation conditions were refined for the thyroid tissue which favored full retention of physiological and morphological characteristics of the parenchyma after storage for 12 months at -196°C. Figures 3; references 10 (Russian).



**Blood Protein Causing Diabetes Discovered**

907C0730A Moscow IZVESTIYA in Russian  
29 Jun 90 Morning Edition p 2

[Article by N. Novodvorskiy, "What Is the Reason for Diabetes?"]

[Text] On June 28, 1990, the State Committee for Patents at the USSR State Committee for Science and Technology registered the discovery made by Prof B. Kudryashov, Doctor of Biological Sciences L. Lyapina, and Candidates of Biological Sciences A. Ulyanov and G. Baskakova, staff members of Moscow State University, and Prof Yu Pytel of the Moscow Medical Institute.

One of the forms of diabetes is related to insufficient production of insulin in the human and animal organism, which causes an excess of sugar in the blood and other complications to arise. What is it that disturbs

the formation of insulin in the pancreas? Specifically, this organ is responsible for its production. The biologists have observed a specific protein of the blood plasma which also blocks pancreatic functioning.

The protein has been studied carefully, and its "guilt" has been proved, in particular by the fact that it is absent in the healthy organism.

The discovery makes it possible to hope for the possibility of early diagnosis of diabetes and the development of drugs for restoring the functions of the diseased pancreas by means of transplantation of healthy parts of the gland from a donor, with concurrent, naturally, medicinal therapy.

All experiments up to this time have been conducted on animals.

**Study of DNA of Vaccine Strain of E Rickettsia Prowazekii and Its Revertant by Restriction Analysis Method**

907C0472 Bratislava ACTA VIROLOGICA in Russian Vol 33 No 5, Sep 89 pp 430-439

[Article by N. M. Balayeva, Ye. B. Rydkina, M. I. Artemyev and V. F. Ignatovich; Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya]

dy the genome of isogenic strains (slightly pathogenic strain E and its virulent revertant strain Evir) obtained in the process of passivation in mouse lungs, a study of their total DNA used restriction endonucleases in a parallel study of DNA of the standard virulent strain Breyln of Rickettsia prowazekii. The complete coincidence of restrictograms of DNA cloned and maintained under ordinary conditions of passivation of Rickettsia prowazekii indicated the absence of variability of DNA of the pathogen during passivation. There were no differences in restrictograms of the genome of isogenic strains E and Evir during use of 17 restrictases which recognize different sequences of the nucleotides. This indicated that strains E and Evir have no pronounced genetic structural differences in spite of stable differences in virulence. These data provided the first evidence, at the molecular-genetic level, of the isogenicity of the slightly pathogenic strain E Rickettsia prowazekii and its virulent revertant, strain Evir. The complete identity of restrictograms of isogenic strain E and Evir, differing in virulence, and their difference from the standard strain Breyln, reflected strain peculiarities not related to virulence. Differences in DNA restriction between strain Breyln and strains E and Evir involved no more than 1-2 fragments and the restriction pictures of all 3 strains were quite similar. The data obtained showed the promise of use of the method of restriction analysis for further study of genetic differentiation of strains of Rickettsia prowazekii. Figures 10; references 30: 6 Russian; 24 Western.

UDC 541.183.24:576.8

**Metal Recovery From Electrolytes by Metallophilic Microorganisms**

907C0618A Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR; SERIYA B—GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 3, Mar 90 (manuscript received 5 Jul 89) pp 52-56

[Article by Z. R. Ulberg, L. G. Marochko, T. A. Polishchuk, V. V. Chepiga, and N. V. Pertsov, Department of Dispersed Systems Science, Physicochemical Institute, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Selected algal and Bacillus sp. were tested for their efficiency in metal recovery from CuCl<sub>2</sub>, MnCl<sub>2</sub>, FeCl<sub>3</sub> and HAuCl<sub>4</sub> solutions and their mixtures. The results demonstrated that Chlorella vulgaris, C. pyrenoidosa, and Scenedesmus obliquus suspensions,

preadapted to gold ions, adsorbed metal ions in the following order: Au > Fe > Cu > Mn. The ranking in the case of Bacillus sp. was as follows: Au > Cu > Fe > Mn. The adsorption process was competitive in nature, with the higher affinity metals precluding binding of metals ranking lower in the series. Heat inactivation and agitation (30-60 min at 80°C) of the algae and the bacteria diminished the extent of metal binding and recovery from the electrolytes, and altered the adsorption patterns. Binding of the metal ions was shown to involve carboxyl groups of surface amino acids, leading to the formation of colloid particles. Figures 3; tables 2; references 7 (Russian).

UDC 663.12/14+532.691:541.18.051

**Surfactant Exolipids of Cryptococcus Albidus Yeast**

907C0618C Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR; SERIYA B—GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 3, Mar 90 (manuscript received 25 Aug 89) pp 72-74

[Article by R. V. Kucher, Academician Ukrainian Academy of Sciences, O. Yu. Lesyk, Ye. V. Karpenko, S. A. Yeliseyev, and A. A. Turovskiy, Department of Combustible Materials Physical Chemistry and Technology, Institute of Physical Chemistry, Ukrainian SSR Academy of Sciences, Lvov]

[Abstract] Physicochemical analysis was conducted on the exolipids produced by Cryptococcus albidus Y-78 to assess their biosurfactant characteristics. Determinations of surface tension effects and micelle formation demonstrated that two extracellular components, identified as a glycolipid and a lipopeptide, possess such activity. Maximum synthesis of the biosurfactants was favored by cultivation on media with sodium citrate as the carbon source. Figures 2; references 10: 3 Russian, 7 Western.

UDC 616.98:579.841.11]-092-07

**Selection Strategy and Biomass Control in Saprophytes: Pseudomonas pseudomallei**

907C0646A Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 1, Jan 90 (manuscript received 8 Feb 89) pp 13-17

[Article by G. M. Larionov and V. D. Belyakov, Volgograd Scientific Research Anti plague Institute; First Moscow Medical Institute imeni I. M. Sechenov]

[Abstract] Growth kinetics were analyzed for Pseudomonas pseudomallei 59361 in order to determine the selection strategy employed by this saprophyte. Results obtained during growth on Gilardi medium with the limit substrate reduced to 0.2 g/L demonstrated that C-competitiveness selection strategy [Velikanov, L.L., et al., Uspekhi Mikrobiologii, No 18, pp 112-117, 1983]

applies to *Ps. pseudomallei*. C-strategy combines elements of r and K strategies, where r strategy relies on rapid growth and K strategy on relatively slow growth in combination with high viability and metabolic adaptability. Accordingly, *Ps. pseudomallei* can maintain high population levels under adverse conditions, accounting in part for its pathogenic potential. Figures 5; references 15: 8 Russian, 7 Western.

UDC 579.842.24:[579.222:547.96/.88

#### Protein Phosphorylation in Plague Etiological Agent

907C0646B Moscow *ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII* in Russian No 1, Jan 90 (manuscript received 17 Jun 89) pp 17-19

[Article by B. N. Mishankin and L. A. Shevchenko, Rostov-on-Don Scientific Research Anti plague Institute]

[Abstract] Studies on protein phosphorylation in *Y. pestis* 556/106 Otten showed this process to be time- and temperature-dependent. Proteins that underwent phosphorylation fell into the 30-60 kD range. At 28°C phosphorylation of 42, 40, 39, and 30 kD proteins was diminished, a 50 kD protein underwent dephosphorylation, and a 45 kD protein was phosphorylated which was not phosphorylated at 37°C. Proteins were intensively phosphorylated at 37°C, and fell into the 62, 50, 45, 42, 40, 39 and 30 kD classes. In addition, prolonged incubation (2 h) led to dephosphorylation of the 62 kD protein. Finally, addition of cAMP to the incubates somewhat inhibited phosphorylation at concentrations

of  $10^{-4}$  M and higher. Protein phosphorylation participates in the organization of rapid responses of the cell to physiologic changes in the environment. Figures 3; references 10: 3 Russian, 7 Western.

UDC 576.851.252.5:577.15.07.155

#### Production of Restriction Endonucleases by *Bacillus* sp.

907C0680A Yerevan *BIOLOGICHESKIY ZHURNAL ARMENII* in Russian Vol 42, No 11, Nov 89 (manuscript received 6 Jul 89) pp 969-972

[Article by V. Ye. Repin, N. I. Rechkunova, S. Kh. Degtyarev, Scientific Research Technical Engineering Institute of Biologically Active Substances, 'Vektor' Scientific Industrial Association, USSR Ministry of Biomedical Industry, Berdsk; A. A. Khachatryan and E. K. Afrikyan, Institute of Microbiology, Armenian SSR Academy of Sciences, Abovyan]

[Abstract] Screening studies were conducted on 58 strains of *Bacillus* sp. to identify additional producers of restriction endonucleases, which showed that 9 percent of the strains produced isoschizomers of known restriction enzymes. The producers and the enzymes were as follows: *B. stearothermophilus* (2 strains)—Bst 28 I and Bst 40 I; *B. licheniformis*—Bli 41 I; *B. brevis*—Bbv 12 I, and *B. sphaericus* Bsp 2095 I. The recognition sequences for the enzymes in question were as follows: Bst 28 I and Bli 41 I (Cla I prototype enzyme)—5'-ATCGAT; Bst 40 I (Msp I)—5'-CCGG; Bbv 12 I (HgiA I)—5'-G(A/T)GC(T/A)C; Bsp 2095 I (Sau 3A I)—5'-GATC. Tables 2; references 14: 9 Russian, 5 Western.

UDC 577.325.2

### Some Aspects of Structural Studies of Aspartic Proteinases

907C0531A Moscow MOLEKULARNAYA  
BIOLOGIYA in Russian Vol 23 No 6, Nov-Dec 89  
pp 1523-1534

[N. S. Andreyeva, A. Ye. Gushchina, A. S. Zhdanov et al.; Institute of Molecular Biology imeni V. A. Engelhardt, USSR Academy of Sciences]

[Abstract] A brief review of scientific results obtained at the laboratory of X-ray crystallographic analysis of the Institute of Molecular Biology, USSR Academy of Sciences during studies of aspartic proteinases presented results obtained in recent years. The most important result of the studies was formulation of the principles of structural organization of aspartic proteinases domains and establishment of a structural template, common for this entire group of enzymes. Objects of study included pepsin, chymosin and HIV protease. Work with pepsin provided more precise definition of the atomic coordinates of the enzyme at a resolution of 1.8 Angstroms with location of all molecules of bound water in monoclinic crystals. The Laboratory of Structure and Functions of Proteins of the University of Edmonton collaborated in this work. Studies of chymosin clearly established the structural bases of its specificity. Ongoing studies in the area of protein engineering of chymosin were discussed briefly. Analysis of regularities of the structure of aspartic proteinases made possible development of the structural template for this class of enzymes and this served as a base for construction of an atomic model of human HIV protease and development of approaches to construction of protease inhibitors. The Institute of Chemical and Biological Physics, ESSR Academy of Sciences is collaborating in studies in the area of protein engineering. Work on proteases of retroviruses began in the laboratory with construction of a molecular model of HIV protease. This construction was completed to assist in development of approaches to construction of protease inhibitors as possible therapeutic agents for use in the control of virus infections. Figures 6; references 17: 4 Russian; 13 Western.

UDC 577.213

### Topoisomerase I From Human Placenta. Functional Activity of Products of Expression of Cloned cDNA Fragments

907C0531B Moscow MOLEKULARNAYA  
BIOLOGIYA in Russian Vol 23 No 6, Nov-Dec 89  
pp 1553-1557

[Article by I. B. Bronshteyn, A. M. Shuster, L. V. Shevchenko et al.; Institute of Molecular Biology imeni V. A. Engelhardt, USSR Academy of Sciences, Moscow]

[Abstract] Immunoscreening of the human placenta cDNA clone library in expression vector  $\lambda$ gt 11 used a

method of non-isotopic detection employing the avidin-biotin system to identify clones coding for human topoisomerase type I. Hybrid protein obtained from E. coli cells extract, infected with recombinant phage  $\lambda$ gt 11, interacted with monoclonal antibodies raised against topoisomerase I from calf thymus with a dissociation constant of  $5.7 \times 10^{-8}$  M. Restrictase fragments of cDNA coding for the topoisomerase polypeptide in the identified hybrid protein were recloned and expression in the pEX vector was obtained. The epitope of binding of the monoclonal antibody to the molecule of the expressed protein was located. The study showed that, during autoimmune diseases, the blood sera of patients which react positively to the polypeptides expressed by the cloned fragment of cDNA of topoisomerase I contain antiidiotypal antibodies which possess DNA-binding activity and most probably represent, to some degree, the structure of the primary antigen. The search for antibodies shows great promise and opens great possibilities for development of different trends in molecular biology ranging from studies of mechanisms of regulation of genetic processes including such a new region of enzymology as "catalytic antibodies" or "abzims". Figure 1; references 13: 1 Russian; 12 Western.

UDC 577.112.6

### Synthesis of Non-linear DNA-binding Peptide, Determinants of Specificity of Binding of Which are Similar to Specificity Determinants of 434 Cro-Repressor

907C0531C Moscow MOLEKULARNAYA  
BIOLOGIYA in Russian Vol 23 No 6, Nov-Dec 89  
pp 1558-1580

[Article by S. L. Grokhovskiy, A. N. Surovaya, N. Yu. Sidorova and G. V. Gurskiy; Institute of Molecular Biology imeni V. A. Engelhardt]

[Abstract] Data concerning synthesis and interaction of peptide II with DNA were presented and discussed. Peptide II is an analog of peptide I and differs from it only because it contains dipeptide Thr-Gln on the N-terminal of four DNA-binding domains. The domains are linked covalently with a carboxyterminal cross-linker groups containing 4 arms each of which ends with an aliphatic aminogroup. CD studies showed that amino acid residues of the peptide appeared in alpha, beta and random conformations in an aqueous solution in 20 percent trifluoroethyl and the level of  $\alpha$ -spiral conformation is about 16 percent at room temperature with an increase up to 40 percent in 40 percent trifluoroethanol. Conformational changes in molecules of the peptide appeared upon formation of a complex between the peptide and DNA and resembled an alpha-beta transition in the DNA-binding, helix-turn-helix motif of 434 Cro repressor. Residues present in helices  $\alpha_2$  and  $\alpha_1$  formed a  $\beta$  hairpin which is inserted into the minor DNA groove. This was confirmed by the fact that the peptide displaces the minor groove binding antibiotic distamycin



from a complex with poly(dA) x poly(dT). DNA protection studies showed that the peptide prefers binding to operator and pseudo operator sites recognized by 434 Cro repressor. It binds firmly to operator sites Q<sub>R</sub>1, Q<sub>R</sub>2 and Q<sub>R</sub>3 and shows the greatest affinity for pseudooperator site Op1. Analysis of nucleotide sequences in strong affinity binding sites of the peptide showed that it, like 434 Cro-repressor, reacts with pseudosymmetric nucleotide sequences 5'ACAA-3' and 5'-CTGT-3'. These sequences may be divided into 6 or 7 pairs of bases. The most powerful binding sites for the peptide on DNA (Op1) motif 5'ACAA is replaced by sequence 5'ACCA-3'. The difference in binding specificity by the peptide and 434 Cro-protein was attributed to flexibility of the connective chains between DNA-binding domains in the peptide molecule and to replacement of the Thr-Ala in the  $\alpha_2$  helix. Removal of the residues from the N-terminal end of helix  $\alpha_2$  in each of the 4 DNA binding domains of 434 Cro in the peptide produced loss of binding specificity although the modified peptide binds to DNA non-specifically. Figures 11; references 43: 14 Russian; 29 Western.

UDC 577.214.622

#### Cloning and Structural Analysis of Genes Coding For Tumor Necrosis Factors and Rabbit Lymphotoxin

907C0531F Moscow MOLEKULARNAYA BIOLOGIYA in Russian Vol 23 No 6, Nov-Dec 89 pp 1743-1750

[Article by A. N. Shakhov, D. V. Kuprash, R. L. Turetskaya et al.; Institute of Molecular Biology imeni V. A. Engelhardt, USSR Academy of Sciences]

[Abstract] Study of the biological properties of tumor necrosis factors, regularities of regulation of their expression and the possible use of them in practical medicine have created great interest in them recently. Hybridization and structural analysis of a clone containing the lymphotoxin gene, isolated from the rabbit genomic library, showed that this recombinant clone contains a previously described gene, coding for tumor necrosis factor (TNF $\alpha$ ). The rabbit genes coding for lymphotoxin (TNF $\beta$ ) and TNF $\alpha$  were arranged in tandem at a distance of about 1000 nucleotides as was previously established for human and mouse genomes. The complete sequence of nucleotides coding for rabbit lymphotoxin gene was determined and the unknown amino acid sequence of rabbit lymphotoxin, whose cDNA has not yet been cloned, was predicted. Several sequences in the assumed regulatory regions upstream of the lymphotoxin gene promoter were detected. They are homologous to sections of binding of known protein transcription factors. Figure 1; references 33: 5 Russian; 28 Western.

UDC 577.217.3:577.113.4

#### In Vitro Suppression of Immunoglobulin mRNA Translation by Alkylating Derivative of Oligonucleotide

907C0632B Moscow MOLEKULARNAYA BIOLOGIYA in Russian Vol 24 No 1, Jan-Feb 90 (manuscript received 14 Mar 89) pp 173-178

[Article by V. V. Vlasov, A. A. Godovikov, V. F. Zarytova, Ye. M. Ivanova, and N. Yu. Nomokonova\*, Novosibirsk Institute of Bioorganic Chemistry, Siberian Division, USSR Academy of Sciences, Novosibirsk; \*Institute of Therapy, Siberian Division, USSR Academy of Medical Sciences, Novosibirsk]

[Abstract] mRNA isolated from IgG-producing MOPC 21 [as published] cells were used in a rabbit reticulocyte cell-free system to assess the effects of antisense oligonucleotides on translation of  $\kappa$ -chain mRNA. The results demonstrated that introduction of the antisense nucleotide pTGCTCTGGTTT had no effect on mRNA translation. However, preincubation of mRNA with 4-(N-chloroethyl-N-methylamino) benzyl-5'-phosphamide- pTGCTCTGGTTT, an alkylating nucleotide, inhibited translation and synthesis of the  $\kappa$ -chains as well as IgG heavy chains. These findings emphasized the importance of covalent binding in inhibition of translation, as well as the interrelationship in the synthesis of IgG light and heavy chains in MOPC 21 cells. Figures 4; tables 1; references 23: 6 Russian, 17 Western.

UDC 577.212.175.3

#### Expression in Escherichia coli of Hybrid Genes Coding for Bovine Adrenocorticotropin Hormone

907C0632B Moscow MOLEKULARNAYA BIOLOGIYA in Russian Vol 24 No 1, Jan-Feb 90 (manuscript received 27 Apr 89) pp 220-230

[Article by A. Sh. Parsadanjan, V. Ye. Karapetyan, P. M. Rubtsov\*, K. G. Skryabin\*, and A. A. Galoyan, Institute of Biochemistry, Armenian SSR Academy of Sciences, Yerevan; \*Institute of Molecular Biology imeni V. A. Engelhardt, USSR Academy of Sciences, Moscow]

[Abstract] Technical details are presented on genetic engineering studies resulting in the creation of a series of plasmids bearing the adrenocorticotropin hormone (ACTH) gene. The nucleotide sequence for ACTH was derived from the bovine proopiomelanocortin gene fused via synthetic adaptors to Staphylococcus aureus protein A gene. Transformation of Escherichia coli resulted in expression of the chimeric gene in the form of a hybrid protein secreted into the periplasmic space. Purification of the protein on IgG-Sepharose columns and subsequent polyacrylamide gel electrophoretic analysis showed that the yield was about 4 mg protein per liter of bacterial culture. Figures 9; references 19: 2 Russian, 17 Western.



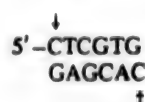
UDC 577.152.314'14

**Bsl: Novel Unusual Restriction Endonuclease**

907C0632C Moscow MOLEKULYARNAYA  
BIOLOGIYA in Russian Vol 24 No 1, Jan-Feb 90  
(manuscript received 4 May 89) pp 244-247

[Article by S. Kh. Degtyarev, A. A. Kolykhalov, N. I. Rechkunova, V. S. Dedkov, and P. A. Zhilkin, All-Union Scientific Research Institute of Molecular Biology, "Vektor" Scientific Industrial Association, Koltsovo, Novosibirsk Oblast]

[Abstract] A novel restriction endonuclease, designated Bsl, has been isolated from *Bacillus sphaericus*. Bsl was found to cleave DNA at a site identified as



This enzyme has no isoschizomers and differs from the majority of known restriction endonucleases in that it cleaves DNA at an asymmetrical target site. Figures 2; references 6: 3 Russian, 3 Western.

UDC 577.217

**tRNA Control of Simultaneous Translation of Ovalbumin and Globin mRNAs in Wheat Germ Cell-Free Protein Synthesizing System**

907C0632D Moscow MOLEKULYARNAYA  
BIOLOGIYA in Russian Vol 24 No 1, Jan-Feb 90  
(manuscript received 5 May 89) pp 248-255

[Article by A. E. Rachkov, N. I. Shulga, N. F. Starodub, and A. V. Yelskaya, Institute of Molecular Biology and Genetics, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] A tRNA-dependent cell-free protein synthesizing system derived from wheat germ was used to assess competition between globin and ovalbumin mRNA molecules in simultaneous translation. Using chicken oviduct and rabbit reticulocyte mRNA and tRNA preparations, experiments were designed to assess globin and ovalbumin synthesis in which one type of mRNA was maintained constant while the other was added in increasing concentrations. The results demonstrated that, depending on the type of tRNA added, the ratio of ovalbumin to globin synthesis could be varied 1.5- to 2-fold. These observations indicate that functional adaptation of tRNA represents a mechanism by which protein synthesis is modulated at the level of translation and chain elongation. Figures 7; references 19: 5 Russian, 14 Western.

UDC 577.152.1

**DNA Diagnostics and Gene Therapy in Hereditary  $\alpha_1$ -Antitrypsin Deficiency**

907C0649A Kiev BIOPOLIMERY I KLETKA  
in Russian Vol 6 No 1, Jan-Feb 90 (manuscript received 13 Jun 89) pp 51-56

[Article by A. L. Shvartsman, M. P. Strakhova, V. S. Gaytskhoki, W. Berger, and C. Coutelle, Scientific Research Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad; Central Institute of Molecular Biology, GDR Academy of Sciences, Berlin-Buch]

[Abstract] A series of clones bearing the cDNA sequence for the  $\alpha_1$ -antitrypsin gene was isolated from human hepatic cDNA library using the expression vector  $\lambda$ gt11. Detailed analysis of the clones revealed absence of nucleotide sequence 30-150 encoding the 5'-end of  $\alpha_1$ -antitrypsin mRNA. Combination of  $\alpha_1$ -antitrypsin cDNA and  $\alpha_1$ -antitrypsin gene nucleotide sequences at a unique Cfr10.1 site on exon II resulted in  $\alpha_1$ -antitrypsin cDNA incorporating  $\alpha_1$ -antitrypsin mRNA codons beginning with position +2. The  $\alpha_1$ -antitrypsin cDNA derived from one clone was used as a molecular probe in studies on hereditary  $\alpha_1$ -antitrypsin deficiency in Soviet and East German families, leading to the demonstration that the genotype was linked to absence of the polymorphic MaeIII site in exon III of the  $\alpha_1$ -antitrypsin gene. In addition, recombinant plasmid pTZ19 was constructed, which carries  $\alpha_1$ -antitrypsin cDNA sequences starting with the  $\alpha_1$ -antitrypsin codon encoding Asp at position 2. It is currently being used for genetic engineering of  $\alpha_1$ -antitrypsin production for eventual therapeutic applications. Figures 5; references 15: 1 Russian, 14 Western.

UDC 616-056.7:616.153.922

**DNA Diagnostics of Familial Hypercholesterolemia**

907C0649B Kiev BIOPOLIMERY I KLETKA  
in Russian Vol 6 No 1, Jan-Feb 90 (manuscript received 13 Jun 89) pp 56-63

[Article by M. Yu. Mandelshtam, L. K. Sasina, and L. A. Shvartsman, Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad]

[Abstract] DNA probes were employed in the analysis of restriction fragment length polymorphisms of the low density lipoprotein receptor gene, with genomic DNA isolated from the blood of patients with familial hypercholesterolemia. The results demonstrated that PvuII, BstEII, AvaII, NcoI and TaqI polymorphisms constitute valuable genetic markers for diagnostic purposes. In addition, the study also resulted in the identification of a new EcoRI polymorphism in the receptor gene. Figures 6; tables 1; references 24: 1 Russian, 23 Western.

UDC 577.21:579.25.5

**Expression of Model Bacterial -Galactosidase Gene in Mouse Fibroblast Culture and Following Direct Intrahepatic Injection***907C0649C Kiev BIOPOLIMERY I KLETKA  
in Russian Vol 6 No 1, Jan-Feb 90 (manuscript received  
24 Jul 89) pp 67-73*

[Article by I. S. Varzanova, L. N. Neborachko, S. P. Shpileva, I. Ye. Kostetskiy, T. V. Stolyar, Ye. M. Sukhorada, L. L. Lukash, and V. A. Kordyum, Institute of Molecular Biology and Genetics, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Hepatitis B virus DNA was employed for the construction of a vector (pHB21) bearing *Escherichia coli*  $\beta$ -galactosidase (*lacZ* gene) for expression studies, as a prelude to studies on expression of human insulin gene using similar vector technology. In C3H mice fibroblast culture (Ltk<sup>-</sup> cells)  $\beta$ -galactosidase was expressed to an equivalent degree whether the gene was under the control of the HbsAg promoter or SV40 early promoter. Differences in expression were apparent following intrahepatic injection of the liposomally-enclosed vectors. Expression was much greater when the gene was under the control of the hepatitis virus surface antigen promoter than under the SV40 promoter. This difference was attributed to the presence of hepatitis B virus enhancer in plasmid pHB21, and demonstrates that hepatitis B virus enhancers are tissue-specific. Figures 4; tables 1; references 7: 3 Russian, 4 Western.

UDC 577.352.27:57.086.3

**Ultrastructural Aspects of Direct Injection of Plasmid DNA-Loaded Liposomes Into Mouse Liver***907C0649D Kiev BIOPOLIMERY I KLETKA  
in Russian Vol 6 No 1, Jan-Feb 90 (manuscript received  
23 Jun 89) pp 73-82*

[Article by K. M. Bilich, D. M. Irodov, and V. A. Kordyum, Institute of Molecular Biology and Genetics, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Ultrastructural analysis was conducted on the fate of empty and plasmid DNA-loaded liposomes prepared by the Ca-EDTA method following intrahepatic injection into two-month-old BALB/c mice. The composition of the liposomes was as follows: 70 percent lecithin, 20 percent cholesterol, 9 percent decyl phosphate, and 1 percent phosphatidylethanolamine, while the plasmid encoded the *Escherichia coli lacZ* gene ( $\beta$ -galactosidase). Ultrastructural monitoring for 30 days demonstrated that the major sequelae involved mitochondria and the Golgi apparatus. Within 5 min electron-dense oligolamellar vesicles were observed in the proximity of hepatocyte nuclei, in nuclear pores, and dilated perinuclear spaces. By day 30 the vesicles had

completely resolved. Within a day of injection the mitochondria were swollen, the cristae fragmented; other changes included partial vacuolization and myelination. The changes were less pronounced with empty liposomes than with loaded liposomes, and for the most part disappeared after 30 days, except for vacuolization and myelination. Early changes also included hypertrophy of the Golgi apparatus, with extensive persistence of changes to day 30. Accordingly, correlation of  $\beta$ -galactosidase activity with the ultrastructural alterations would appear to be warranted. Figures 4; references 14: 7 Russian, 7 Western.

UDC 577.21:579.25.5

**Expression of Human Insulin Gene in Mammalian Cell Cultures***907C0649E Kiev BIOPOLIMERY I KLETKA  
in Russian Vol 6 No 1, Jan-Feb 90 (manuscript received  
23 Jun 89) pp 82-87*

[Article by L. L. Lukash, L. N. Neborachko, Ye. M. Sukhorada, Ye. V. Usenko, I. S. Varzanova, S. V. Podolskaya, T. I. Buzhiyevskaya, and V. A. Kordyum, Institute of Molecular Biology and Genetics, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Plasmid pBR322ins, constructed specifically to bear the human insulin gene, was employed for transfection of diploid human fibroblasts derived from embryonal pulmonary tissue and murine fibroblast culture (C3H10T1/2) to test gene expression in different mammalian cell lines cultured in relatively growth factor-poor 10 percent bovine serum medium. In both cultures insulin synthesis began in 3 days, reaching a maximum of over 240 ng/ml in about 10 days ( $p < 0.001$ ), and falling to essentially control levels (30 ng/ml) after 16 days. On subculture, insulin synthesis again increased, approaching 200-240 ng/ml after 5-7 passages, a phenomenon accompanied by improved cell viability. These findings demonstrated that the human insulin gene lacking the tissue-specific regulatory sequence is capable of efficient functions in various mammalian fibroblast lines and improves viability by providing an essential growth factor (insulin). Figures 2; tables 1; references 8: 3 Russian, 5 Western.

UDC 577.21:579.25.5

**Regulation of Exogenous Human Insulin Gene Expression in Human Fibroblasts by Regulatory Region of *Drosophila hsp70* Gene***907C0649F Kiev BIOPOLIMERY I KLETKA  
in Russian Vol 6 No 1, Jan-Feb 90 (manuscript received  
24 Jul 89) pp 88-90, 106*

[Article by L. N. Neborachko, L. L. Lukash, I. S. Varzanova, and V. A. Kordyum, Institute of Molecular Biology and Genetics, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] An analysis was conducted on the control of exogenous human insulin gene expression in diploid

human fibroblast culture by the regulatory region of the drosophila hsp70 gene. To that end, plasmid pGA307 was constructed bearing both components and used for target cell transfection, and 3 days later subjected to heat shock. An induction of 120 min at 42°C resulted in the synthesis of about 250 ng/ml of proinsulin/insulin, while in the absence of a heat shock constitutive synthesis was on the order of 60 ng/ml. These findings indicate a novel approach to heat-based control of human gene expression and product yield improvement. Figures 2; references 8: 1 Russian, 7 Western.

UDC 577.023

**Relative Efficiencies of Early and Late Phage T7 Promoters in  $\beta$ -Galactosidase Gene Expression in *Escherichia coli***

907C0649G Kiev BIOPOLIMERY I KLETKA

in Russian Vol 6 No 1, Jan-Feb 90 (manuscript received 6 Feb 89) pp 100-103

[Article by L. G. Glushakova, O. R. Romanovskaya, and V. A. Kordyum, Institute of Molecular Biology and Genetics, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] A model system was devised to assess  $\beta$ -galactosidase gene expression in *Escherichia coli* JM103

under the control of early and late phage T7 promoters. To that end a recombinant plasmid GEM-1-z was constructed, derived from commercially available GEM-1 (Promega; USA), which bore T7 late promoter. Analysis of GEM-1-z transformed cells infected with phage  $\phi$ T7 showed rapid, within 3-4 h, expression of  $\beta$ -galactosidase activity with the late promoter, terminated by lysis. Infection of *E. coli* JM103 GEM-1-z cultures with  $\lambda$ 1857 phages bearing the early promoter A3 allowed for multiple cycles of cell multiplication and reinfection, resulting in a gradual increase in  $\beta$ -galactosidase activity over a prolonged (22 h) period of time. Figures 2; references 11: 4 Russian, 7 Western.

UDC 612.663.014.426

**Effects of High Intensity Constant Magnetic Field on Reproduction of Male Rats**

907C0651D Moscow KOSMICHESKAYA BIOLOGIYA  
I AVIAKOSMICHESKAYA MEDITSINA in Russian  
Vol 24 No 1, Jan-Feb 90 (manuscript received 6 Dec 88)  
pp 28-30

[Article by L. V. Kokoreva, T. A. Chuvpilo, and A. M. Postynnikova]

[Abstract] Male Wistar rats weighing 440 g were subjected to 0.4 tesla constant magnetic field for either 3 h in a single exposure or for 3 h per day for 56 days. These males were subsequently mated with 250 g Wistar female rats to assess the reproductive effects. The results and conclusions were based on an analysis of a number of parameters, including perinatal mortality, fetal and placental weight and hydration, and rate of gravidity. The data demonstrated that a single exposure of the type specified was apparently innocuous in terms of the gametes and reproductive factors. However, multiple exposures resulted in an increase in preimplantation embryonal loss (165 percent vs. control data) and in total fetal loss (146 percent vs. control data). The corresponding data for the single-exposure rats were actually slightly below the control figures. Evidently, multiple exposures to constant magnetic fields may lead to an increase in lethal mutations in the gametes. Figures 1; tables 1; references 8: 7 Russian, 1 Western.

UDC 612.17.014.1:576.314].015:547.915].014.426

**Effects of Multiple Exposure to 50 Hz Alternating Magnetic Field on Lipid Phase of Cardiac Plasma Membrane in Rat**

907C0651E Moscow KOSMICHESKAYA BIOLOGIYA  
I AVIAKOSMICHESKAYA MEDITSINA in Russian  
Vol 24 No 1, Jan-Feb 90 (manuscript received 19 Aug 88) pp 30-31

[Article by O. N. Chernysheva]

[Abstract] The pathogenetic mechanisms of a 50 Hz alternating magnetic field (9.4 mT, 7.5 kA/m) on the heart were studied in 170-210 g male outbred mice in terms of plasma membrane lipids. Exposure of the

animals to the field for 5 h per day for 15 days resulted in a 15 percent increase in phospholipids, a 58 percent increase in free fatty acids, a 47.5 percent increase in triglycerides, a 28.5 percent increase in cholesterol esters, and a 49 percent increase in phosphatidylinositol, with a concomitant reduction in the cholesterol/phospholipid ratio. The changes were indicative of an increase in fluidity of the lipid phase of the plasma membrane, which may be one of the factors in magnetic field-induced heart damage. Tables 1; references 12: 10 Russian, 2 Western.

UDC 612.43/.45+612.11].014.426

**Endocrine and Hematologic Effects of Low Frequency Pulsed Electromagnetic Field in Rats Following Single and Long-Term Exposure**

907C0653I Moscow KOSMICHESKAYA BIOLOGIYA  
I AVIAKOSMICHESKAYA MEDITSINA in Russian  
Vol 24 No 2, Mar-Apr 90 (manuscript received 5 May 88) pp 56-60

[Article by Ye. A. Zagorskaya and G. P. Rodina]

[Abstract] Male Wistar rats were employed in assessment of the endocrine and hematologic sequelae of single and long-term exposures to low frequency pulsed electromagnetic fields (PEMF). The experimental conditions involved a single 20 min, 1 h or 2.5 h exposure to a 20 mTesla (mT) PEMF, or a 0.1 mT field for 2.5 h or for 6 h/day for 30 days. In general, PEMF induced short-term elevations in corticosterone that, for the most part, were within the range of normal fluctuations, while serum testosterone increased to 60 percent above baseline. Thyroid hormones showed, for the most part, depression following exposure to the 0.1 mT PEMF, but 20 min of exposure to the 20 mT PEMF led to depression of serum  $T_4$  levels for at least 2 months. Trials with 5 h immobilization stress revealed generally the same patterns in hormonal changes seen in control animals, although stress-induced elevation of corticosterone in PEMF animals was somewhat greater. Similarly, stress-induced depression of thyroid hormones and testosterone was somewhat more pronounced in the PEMF rats. A single exposure to 20 mT PEMF for 2.5 h resulted in lymphopenia that persisted for 2 months, while 30 days of irradiation with a 0.1 mT field resulted in eosinopenia with gradual reversal over a two-month period. Figures 4; references 25: 14 Russian, 11 Western.



UDC 612.824+612.82

**Ways of Optimizing Cerebral Blood Circulation During Extreme Effects on Brain**

907C0507C Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOVA in Russian Vol 75 No 11, Nov 89 pp 1568-1575

[Article by B. V. Gaydar, V. Ye. Parfenov and G. B. Vaynshteyn; Laboratory of Comparative Physiology of Blood Circulation (head, Yu. Ye. Moskalenko), Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad]

[Abstract] Compounds from a group of actoprotectors capable of preserving the energy balance of cells due to activation of energy-producing reactions of the metabolism show promise for producing a favorable effect on cerebrovascular reactivity. Mildronate, synthesized at the Institute of Organic Synthesis, LatSSR Academy of Sciences, which inhibits free fatty acids oxidation and prevents glycolysis and which dominates during hypoxia of the nerve cells and thus can normalize the metabolic contours of regulation of the cerebral vessels, produces such an effect. This study described an attempt to explain the possibility of optimizing functioning of the cerebral blood circulation during some extreme effects (such as ischemia and impairment of a section of the brain) by increasing the cerebral blood flow and, mainly, by normalizing reactivity of the cerebral vessels. Chronic experiments on 2.5-3.4 kg rabbits involved implantation of 100  $\mu$ m platinum electrodes to record volumetric blood flow by the oxygen clearance method after mildronate administration in a dose of 25 mg/kg of rabbit weight into the auricular vein in four series of experiments. The experiments confirmed the positive role of the actoprotector mildronate in accelerating restoration of changed indicators of reactivity of the cerebral vessels after modeling a mechanical injury and cerebral ischemia. The experiments showed that the most effective drugs for treating extreme effects on brain tissues may be drugs which primarily, restore autoregulation of the cerebral vessels based on their normal reactivity and not the absolute level of blood flow. Mildronate, as an analog of natural metabolites, gamma-butyrobetains, "prosthesizes" a fragment of the metabolic cell processes and helps to restore the energy metabolism of the cells. The study confirmed the optimizing effect of actoprotectors, especially mildronate. Figures 4; references 21: 14 Russian; 7 Western.

UDC 615.214.31.015.4:[612.014.477.064+612.592].036

**Effectiveness and Mechanisms of Sydnocarb in Simulated Weightlessness and Hypothermia**

907C0653E Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 24 No 2, Mar-Apr 90 (manuscript received 19 Apr 89) pp 41-46

[Article by N. G. Lakota, M. M. Kvasova, I. M. Larina, D. V. Vorobyev, and G. Z. Ostrovskaya]

[Abstract] A multifactorial analysis was conducted on the therapeutic efficiency of sydnocarb in simulated weightlessness and hypothermia. The study involved 6 volunteers, swimming in ice water, and immersion in water. In the swimming trials the experimental subjects received 0.03 g of sydnocarb at 1, 3, 6, 9, and 12 h after the start, and in the 48 h immersion trial 0.01 g twice per day in the morning. The biochemical and physiological data demonstrated that sydnocarb had a beneficial effect in maintaining body temperature at a steady baseline. The presumed mechanism of action involves mitigation, but not abolition, of stress impact on the central nervous system. A key factor involves activation of catecholamine mechanisms, predominantly noradrenergic, which stimulate glycolysis and shivering thermogenesis. In situations with limited motor activity this mechanism appears to be adequate in preventing depletion of ATP reserves and a two- to three-fold increase in gas exchange, as seen in the placebo subjects. In addition, sydnocarb was most effective in sprinter-type subjects with a large muscle mass and predominance of fast fibers. Figures 3; tables 3; references 43: 27 Russian, 16 Western.

UDC 612.17.06:612.822.1.015.348.06.612.821.7

**Delta Sleep Inducing Peptide in Cardiovascular Modulation: Theoretical Basis for Clinical Trials**

907C0659A Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 24 No 2, May-Jun 90 (manuscript received 9 Nov 89) pp 23-28

[Article by L. S. Ulyaninskiy, V. T. Ivanov, I. I. Mikhaileva, and K. V. Sudakov]

[Abstract] A review is presented of the effects of delta sleep inducing peptide (DSIP) on the cardiovascular system in order to provide rationale for its clinical trials as a cardiovascular agent. Extensive studies on rats and rabbits commenced after the demonstration that DSIP

protected animals from heart failure in situations of extreme stress which commonly ended in death. More advanced in vivo and in vitro studies demonstrated that intravenous administration of nanogram levels of DSIP enhanced parasympathetic influences on the heart while attenuating the effects of sympathetic fibers. Furthermore, studies with anti-DSIP antisera counteracted the effects of DSIP. Current knowledge holds that the mechanism(s) of action of DSIP involved its interaction with neurotransmitters at the level of peripheral synapses, i.e., DSIP has been shown to potentiate the negative chronotropic effects of acetylcholine and to weaken the positive chronotropic effect of norepinephrine. Other direct findings include the fact that DSIP counteracts the hypertensive sequelae of direct electrical stimulation of the ventromedial hypothalamus and elevates the threshold for ventricular extrasystoles. Figures 4; references 24: 20 Russian, 4 Western.

UDC 612.453.018:577.175.536].  
014.46:615.362.438.017:615.275.4].085.23

#### Effects of Tactivin on Corticosterone Synthesis by Murine Adrenal Cell Suspension

907C0660E Moscow BYULLETEN

EKSPERIMENTALNOY BIOLOGII I MEDITSINY

in Russian Vol 109 No 1, Jan 90 (manuscript received 29 May 89) pp 53-55

[Article by Ye. V. Ignatyeva, V. M. Chesnokova, and L. N. Ivanova, Laboratory of Physiological Genetics, Institute of Cytology and Genetics, Siberian Division, USSR Academy of Sciences, Novosibirsk]

[Abstract] An in vitro study was conducted with tactivin to assess its effects on corticosterone production by a suspension of adrenal cells derived from female BALB/c mice. Incubation systems containing  $0.8$  or  $1.2 \cdot 10^6$  cells/ml in Krebs-Ringger solution demonstrated that tactivin concentrations in the  $0.08$ - $2 \mu\text{g/ml}$  range significantly inhibited corticosterone synthesis. In addition, tactivin also counteracted an adrenocorticotropin hormone-mediated rise in corticosterone production. These observations provide further confirmation for biological interconnection between the endocrine and immune systems, in this case involving the thymic peptide tactivin. Figures 3; tables 1; references 12: 6 Russian, 6 Western.

UDC 340.67:615.285.7.099

#### Expert Criteria in Assessing Severity of Acute Chemical Poisoning With Organophosphorus Insecticides

907C0681B Moscow SUDEBNO-MEDITSINSKAYA

EKSPERTIZA in Russian Vol 33 No 2, Apr-Jun 90

(manuscript received 2 Oct 89) pp 28-30

[Article by V. N. Dagayev, A. I. Iskandarov, Ye. A. Luzhnikov, E. E. Gorin, Zh. A. Lisovik, and A. N.

Yelkov, Chair of Forensic Medicine, First Moscow Medical Institute imeni I. M. Sechenov; All-Union Center for Treatment of Acute Poisoning, Scientific Research Institute of Emergency Medicine imeni N. V. Sklifosovskiy, Moscow]

[Abstract] Toxicometric studies were conducted to provide expert criteria for forensic toxicology in case of poisoning with organophosphorus insecticides. Specifically, an investigation of 296 cases involving poisoning with Malathion or Trichlorfon involved probit analysis of the relationship between blood insecticide levels and clinical outcome, as well as the relationship between depression of blood cholinesterase activity and outcome. The results showed that for Malathion the respective  $CL_{01}$ ,  $CK_{50}$  and  $CL_{100}$  values were  $0.03$ ,  $1.04$ , and  $3.03 \mu\text{g/ml}$ , and for Trichlorfon  $0.21$ ,  $3.81$ , and  $8.51 \mu\text{g/ml}$ , respectively. Studies on cholinesterase demonstrated that a 50 percent reduction in activity was compatible with 100 percent survival. However, a reduction to 49 to 3 percent of baseline activity was life-threatening, while reduction to  $< 3$  percent was fatal. Figures 3; tables 2; references 2 (Russian).

UDC 632.4.01/.08

#### Dermatotoxicity of Structurally-Related Trichothecenes of Fusarium Fungi

907C0681A Moscow DOKLADY VSESOYUZNOY

ORDENA LENINA I ORDENA TRUDOVOGO

KRASNOGO ZNAMENI AKADEMII

SELSKOKHOZYAYSTVENNYYKH NAUK IMENI V. I.

LENINA in Russian No 2, Feb 90 (manuscript received

4 Apr 89) pp 52-55

[Article by A. N. Leonov, Ye. V. Zotova, N. A. Soboleva and G. P. Kononeko, All-Union Scientific Research Institute of Veterinary Sanitation]

[Abstract] The dermatotoxicity of a series of trichothecenes was assessed in terms of minimum effective doses for an erythematous skin response after 48 h in  $2.5$ - $3.0 \text{ kg}$  chinchilla rabbits. The study led to the identification of diacetoxyscirpenol ( $0.004 \mu\text{g}$ ), T-2 toxin ( $0.004 \mu\text{g}$ ), NT-2 ( $0.01 \mu\text{g}$ ), and 4-acetylvalenol ( $0.01 \mu\text{g}$ ) as the most toxic agents. These compounds differed in substituents at position  $C_8$ , but bear a hydroxyl group at  $C_3$ , and two acyloxyl groups on  $C_4$  and  $C_{15}$ . In addition, minimum doses eliciting a skin inflammatory response after 24 h were also shown to be useful in screening studies for assessing the toxicogenic potential of *Fusarium* fungi. Tables 1; 10: 2 Russian, 8 Western.

UDC 612.1.612.822

**Various Tendencies in Changes in Zoosocial Behavior in Hamydryas Baboons Upon Administration of Mediators of Cellular and Humoral Immunity, Thymosin and Myelopeptides**

907c0024D Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 307 No 4, Aug 89 (manuscript received 2 Dec 88) pp 1013-1015

[Article by V. A. Fedan, I. A. Voyt, L. A. Zakharova, V. G. Likhoded, A. M. Chirkov, O. G. Sakandelidze and T. G. Urmancheva, Scientific Research Laboratory of Biologically Active Substances of Hydrobionts, Moscow; Institute of Experimental Pathology and Therapy, USSR Academy of Medical Sciences, Sukhumi; Institute of Immunology, Moscow]

[Abstract] An assessment was conducted on the behavioral effects of exogenous thymosin (fraction 5) and myelopeptides (porcine) in hamadryas baboons in order to further define their action on the CNS. The evaluation was based on the duration and sequence of 54 behavioral elements following intravenous administration of 0.5 mg/kg thymosin or the myelopeptides to the 8-10-year-old (28-35 kg) baboons. Monitoring of the animals for 1.5 h immediately after drug administrations, as well as at subsequent periods of time, demonstrated that thymosin had a significant effect in alleviating aggressive behavior, both in terms of duration and in the number of contacts. However, conventional social behavior was not affected and the number of contacts actually increased. Myelopeptide administration had the opposite effect, with a noticeable increase in aggressiveness. Thus, thymosin was seen to reduce the level of stress, while the myelopeptides rendered the animals more susceptible to stress. In that sense thymosin and the myelopetides appear to function as antagonistic systems. Figures 1; references 8: 7 Russian, 1 Western.

UDC 612.273+577.4

**Protector Effect of Different Kinds and Regimes of Adaptation to Hypoxia on Development of Stress Injuries in Rats**

907C0507D Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOVA in Russian Vol 75 No 11, Nov 89 pp 1576-1584

[Article by A. L. Krushinskiy, T. V. Ryasina, V. B. Koshelev et al.; Department of Human and Animal Physiology (head - I. P. Ashmarin), Physiology of the Higher Nervous Activity (head - V. V. Shulgovskiy), Department of Biology, Moscow State University imeni M. V. Lomonosov, Laboratory of Pathological Anatomy, Scientific Research Institute of Neurology USSR Academy of Medical Sciences (head - I. G. Lyudkovskaya)]

[Abstract] A study, on a neurological model, of the possibility of preventing acute impairments of cerebral

blood circulation with the use of different methods and regimes of training of the organism to oxygen insufficiency used Kurshinskiy-Molodkina rats, which are prone to audiogenic spasmodic seizures, to reproduce experimental hemorrhagic insult. The rats (322 rats, age 5-15 months, both sexes) became adapted to hypoxia in a pressure chamber, in the alps or by breathing a hypoxic gas mixture (GGS-10). A decrease in mortality, in severity of disturbances of movement and in the frequency of rise and degree of pronouncement of intracranial hemorrhages appeared under the different regimes of adaption to hypoxia (prolonged, brief, constant, interrupted regimes). Experiments with GGS-10 revealed a reduction of excitability of the central nervous system. The latent period increased and the intensity of the seizures decreased. A 2-hour normobaric hypoxic stimulation prevented an increase of the level of products of peroxide oxidation of lipids and helped to increase the cyclic nucleotides level in the cerebral hemisphere of the rats. Figures 5; references 25: 21 Russian; 4 Western.

UDC 616-001.11-092.9-07:616.831.9-008.818.1

**Methodology for Intracranial Assessment of Cerebrospinal Fluid and Hemodynamics in Long-Term Experimental Decompression Studies**

907C0651G Moscow KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA in Russian Vol 24 No 1, Jan-Feb 90 (manuscript received 28 Jun 88) pp 47-49

[Article by A. B. Korolev]

[Abstract] Technical details are presented on the surgical aspects involved in the construction of a polystyrene window in the skull of rabbits for observation of CSF and blood dynamics in decompression experiments. Five to seven days after surgery pressure chamber studies were performed in which the animals were subjected to a pressure of 11 atm for 30 to 60 min in air. The compression and decompression to 1 atm were accomplished in 4 and 5 min, respectively. In none of the cases were gas bubbles observed in the arteries. Figures 4; references 2: 1 Russian, 1 Western.

UDC 616.16-008.6-02:613.863]-085.357:577.175.82]-039.71

**Effects of Substance SP<sub>1-11</sub> and Its N-Terminal Fragment P<sub>1-4</sub> on Microcirculation in Stress**

907C0660B Moscow BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY in Russian Vol 109 No 1, Jan 90 (manuscript received 3 Apr 89) pp 25-27

[Article by M. P. Gorizontova, T. V. Speranskaya, P. Oehme, and J. Odaryuk, Laboratory of General Pathology of Microcirculation, Scientific Research Institute of General Pathology and Pathologic Physiology,

USSR Academy of Medical Sciences, Moscow; Institute of Physiologically Active Substances, GDR Academy of Sciences, Berlin]

[Abstract] Effects of stress and  $P_{1-11}$  ( $SP_{1-11}$ ) and its N-terminal fragment  $P_{1-4}$  on mesenteric circulation were studied in 200-225 g male Wistar rats subjected to 5 h of immobilization in the supine position. Immobilization resulted in sluggishness, particularly in 20-60  $\mu$ m-diameter venules, red blood cell aggregation in capillaries and venules, appearance of 'plasmatic' vessels, stasis, mast cell degranulation, increased venular permeability, and increased lymphatic contractility. Intraperitoneal administration of 125  $\mu$ g/kg of substance  $P_{1-11}$  at the onset of immobilization exacerbated the microcirculatory sequelae of immobilization and attenuated thymic involution. Administration of 53  $\mu$ g/kg of  $P_{1-4}$  attenuated thymic involution and had a tranquilizing effect on all of the animals, as evidenced by absence of vocalization and movements. Sedation was noted in 30 percent of the animals and narcosis in 20 percent. In the tranquilized rats  $P_{1-4}$  did not modify the microcirculatory changes, but reversed microcirculatory deterioration in animals responding with sedation and narcosis. Figures 2; tables 2; references 11: 7 Russian, 4 Western.

UDC 616.432-089.87-092.9-06: [613.863-092.612.766.2]-085.357:577. 175.343/.346]-036.8-07:616.441-008.6

#### Thyroid Effects of Exogenous Vasopressin and Oxytocin in Hypophysectomized and Immobilized Rats

907C0660C Moscow BYULLETON  
EKSPERIMENTALNOY BIOLOGII I MEDITSINY  
in Russian Vol 109 No 1, Jan 90 (manuscript received 28 Jun 88) pp 30-33

[Article by I. A. Krasnovskaya and T. V. Sheybak, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad]

[Abstract] Male Wistar rats weighing 120-140 g were used in a study designed to determine whether vasopressin and oxytocin possess a direct mechanism of action on the thyroid gland. The series of experiments involved intact and hypophysectomized rats, 20 min of immobilization in the supine position 6-7 days after the operation, histologic examination of the thyroid, and intraperitoneal administration of 5 ng/100 g of vasopressin or 15 ng/100 g of oxytocin to the various groups. The results showed that vasopressin and oxytocin stimulated thyroid function in the hypophysectomized rats, particularly in the stressed animals. In the case of vasopressin the height of the thyrocytes increased by 154 percent in comparison with unstressed hypophysectomized rats, and by 126 percent in oxytocin-treated rats. The explanation of this phenomenon remains enigmatic since in intact animals subjected to immobilization the thyroid is not affected despite a rise in blood levels of vasopressin and oxytocin. However, it may be related to

depressed somatostatin levels in the hypophysectomized rats, a hormone that has an inhibitory effect on the TSH-thyroid gland system. Figures 3; references 17: 7 Russian, 10 Western.

UDC 615.31:577.112.6].015.4:613.863

#### Antistress Mechanism of Delta Sleep Inducing Peptide

907C0660D Moscow BYULLETON  
EKSPERIMENTALNOY BIOLOGII I MEDITSINY  
in Russian Vol 109 No 1, Jan 90 (manuscript received 3 Apr 89) pp 46-47

[Article by R. Yu. Yukhananov, V. V. Rozhanets, I. I. Mikhaleva and A. I. Mayskiy, Laboratory of Prevention and Treatment of Drug Addiction by Drugs, Scientific Research Institute of Pharmacology, USSR Academy of Medical Sciences; Laboratory of Peptide Chemistry, Institute of Bioorganic Chemistry imeni N. N. Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] Plasma and tissue levels of a series of hormones and opioids were analyzed in a study designed to delineate the mechanism of delta sleep inducing peptide action in alleviating stress. Experiments on 180-220 g male rats immobilized for 6 h in the prone position showed statistically significant elevation of plasma corticosterone, beta-endorphin, and adrenocorticotropin hormone, and of met-enkephalin in the adrenals. In addition, a statistically significant depression of met-enkephalin was detected in the striatum and medulla oblongata. Intraperitoneal administration of 0.1 mg/kg of delta sleep inducing peptide 1 h before immobilization attenuated the rise in corticosterone and potentiated the fall in striatal enkephalins. On the basis of these findings, the results were interpreted to indicate that the endogenous opiate system is not involved in delta sleep inducing peptide-mediated alleviation of stress, but that its mechanism of action involves the hypophyseal-adrenocortical axis. Tables 2; references 12: 5 Russian, 7 Western.

UDC 612.419.017.1.019.08

#### Effects of High and Low Molecular Weight Soluble Bone Marrow Factors (Myelopeptides) on Antibody Formation and Nociception in Animals

907C0660F Moscow BYULLETON  
EKSPERIMENTALNOY BIOLOGII I MEDITSINY  
in Russian Vol 109 No 1, Jan 90 (manuscript received 30 Apr 89) pp 55-57

[Article by O. G. Yanovskiy, L. A. Zakharova, and A. M. Vasilenko, Laboratory of Immune System Mediators, Institute of Bioorganic Chemistry, USSR Academy of Sciences, Moscow]

[Abstract] Porcine myelopeptides fractionated into 40-150 kD, 2 kD, and 1.0 kD components were tested for their effects on nociception and splenic antibody-forming cells in 18-22 g female (CBA x C57B1)F<sub>1</sub> mice.



Various dose-dependent effects were observed with dosages on the order of  $4.6 \cdot 10^{-6}$  to  $4.6 \cdot 10^{-4}$  g/mouse. The 40-150 kD fraction prolonged the latent period for the pain response by 30-95 percent after 30 min and markedly inhibited antibody-forming cells against sheep red blood cells. The analgesic effects of the 2 kD fraction were evident within 15 min of administration, persisted for 2 h, and induced a three- to nine-fold increase in antibody-forming cells. The 1.0 kD fraction was accompanied by an analgesic effect only after 30 min, but not after 15 or 60 min. In addition, this fraction induced a 10- to 16- fold increase in antibody-forming cell levels in comparison with control mice. These observations point to the intricate interrelationships that exist between nociception and immune surveillance, but whether both phenomena are affected by identical or different molecular species in the myelopeptide fractions remains open to speculation. Figures 3; references 8: 6 Russian, 2 Western.

UDC 612.57

#### Central and Peripheral Effects of Leu-Enkephalin on Body Temperature Homeostasis

907C0683A Yerevan DOKLADY AKADEMII NAUK ARMYANSKOY SSR in Russian Vol 90 No 1, 1990, pp 45-48

[Article by R. A. Arutyunyan, L. A. Saakova, D. S. Sarkisyan, Dzh. K. Khachatryan, G. Kh. Saakyan, and K. R. Arutyunyan, Institute of Physiology imeni L. A. Orbel, Armenian SSR Academy of Sciences]

[Abstract] Investigations on rabbits demonstrated that intravenous administration of  $66.0 \mu\text{g/kg}$  of leu-enkephalin induced hypothermia, with the temperature falling by  $0.4\text{--}0.55^\circ\text{C}$  in the colon, anterior hypothalamus, and the neck muscles. Pinnal temperature drop was on the order of  $2.74^\circ\text{C}$ . Administration of  $10.79 \mu\text{g/kg}$  of leu-enkephalin directly into the medial preoptic region of the hypothalamus induced a temperature drop of  $0.32\text{--}0.45^\circ\text{C}$  in the 'internal' regions, and a  $7.63^\circ\text{C}$  drop in the pinna. The 'central' hypothermic effects of

leu-enkephalin were attributed to depression of the circulating levels of norepinephrine and thyroxine and depression of glycolytic, proteolytic, and other thermogenic mechanisms. The peripheral (pinnal) hypothermic effects of leu-enkephalin were ascribed to excitation of alpha-adrenergic vascular receptors, leading to vasoconstriction and diminished blood flow. Figures 1; tables 2; references 9: 3 Russian, 6 Western.

UDC 612.13

#### Effects of Normo- and Hypobaric Hypoxia on Cerebral and Femoral Muscle Circulation

907C0702A Kiev FIZIOLOGICHESKIY ZHURNAL in Russian Vol 36 No 2, Mar-Apr 90 (manuscript received 6 Mar 89) pp 95-99

[Article by V. P. Agafonov, Leningrad Institute of Advanced Training of Physicians imeni S. M. Kirov, USSR Ministry of Health]

[Abstract] Microcirculatory effects of normo- and hypobaric hypoxia were investigated in 200-250 g male rats under the following conditions: 20-160 sec at 41 kPa (0.4 atm) to 81 kPa (0.8 atm), with corresponding  $pO_2$  values of 64 to 128 mm Hg, as well as under normobaric conditions with equivalent  $pO_2$ s. The results demonstrated that hypoxia led to an increase in the total volume of blood flow and a decrease in linear velocity in the cerebral hemispheres and the femoral adductor muscle, indicating thereby an increase in the net cross-sectional area of the microcirculatory bed. Consequently, hypoxia was shown to activate vasodilatory mechanisms. These changes were particularly noticeable in the brain with moderate hypoxia in normo- and hypobaric conditions, with the degree of increase in volume exceeding the decrease in linear velocity. The inverse was detected in the femoral muscle, indicating redistribution of the blood to vital organs. Hypoxia in combination with hypobarism diminished both volume and velocity in the skeletal muscle, with the analogous changes in the cerebral circulation considerably attenuated. The latter changes were attributed to diminished pumping efficiency of the heart. Figures 2; references 5 (Russian).

### Kovalenko Describes Epidemic Prevention After Armenian Earthquake

18402044 Moscow MEDITSINSKAYA GAZETA  
in Russian 19 May 89 p 2

[Interview by MEDITSINSKAYA GAZETA correspondent with V. N. Kovalenko, USSR deputy chief state health physician: "How an Epidemic Retreated: Some Lessons From Armenia"]

[Abstract] USSR Deputy Chief State Health Physician V. N. Kovalenko was interviewed concerning the sanitation and epidemiological conditions in Armenia after the earthquake. Kovalenko pointed out that the water supply, sewerage systems, and central heating supply lines were all nonfunctional. Human and animal corpses and rotting fruit and vegetables attracted rats and other rodents carrying disease. Help had to be called upon from the outside, because many workers of the sanitation and epidemiological service had perished in the earthquake. Specialized antiepidemic brigades were organized from among volunteers arriving from various scientific-research institutes. Each brigade had about 70 specialists: epidemiologists, hygienists, laboratory personnel, bacteriologists, etc. Water and food control was set up along with physical checks of all personnel involved in food handling. Individual screening was initiated to detect early signs of infections. Since water lines were broken, available water was chlorinated even to an excess, before distribution for general use; available water trucks were used to deliver water to outlying areas. The next task was to reestablish the sewerage system, which threatened contamination of the underground water table. Strict attention was paid to possible infection carriers: some food distribution points were closed to prevent the spread of disease. As a result not a single epidemic nucleus was registered. With the approaching summer, the water supply is still a problem, especially in the outlying areas. Repairs of sanitation facilities are going very slowly.

### Status and Prospects of Health Care for Mothers and Children in Kazakh SSR

907C0082 Alma-Ata ZDRAVOOKHRANENIYE  
KAZAKHSTANA in Russian No 7, Jul 89 pp 1-7

[Article by T. A. Izmukhambetov, Kazakh SSR Minister of Health]

[Text] At its 12th session, the Kazakh SSR Supreme Soviet adopted a detailed decree on the principal health care problems, among which the problem of health care for mothers and children was singled out. The situation in this area remains serious, and the efforts of the health care authorities alone cannot accomplish fundamental changes. Social prevention of diseases is needed. The first people's commissariat for health, N. A. Semashko, said it this way: "We must reach out with both our hands for the most important link—care for mothers and

children—and then we will be able to tie the whole chain together and thus improve the health of the entire population."

Today, 8.5 million persons, or 51.0 percent, of the republic's 16.7 million population are women. Children 14 or under account for 5.2 million, or one-third of the total population. Thus, the problem under discussion concerns the health status of an absolute majority of the republic's inhabitants (82 percent).

Every year, more than 400,000 children are born in our republic. Given their high percentage in the structure of the population (31.5 percent, as opposed to the national average of 24.7 [ ]percent) and the high birth rate (24.5 per 1,000 inhabitants, as opposed to 19.0 for the USSR), Kazakhstan belongs to the demographically advanced regions.

Children 0-14 years of age account for 14.8 percent of the total number of deaths in the republic. Moreover, 67 percent of child mortality occurs in children under one year of age—so-called infant mortality.

Child mortality in the Kazakh SSR has not decreased over the last eight years. According to the 1988 data, its level was 29.2 per 1,000 births as opposed to 24.0 for the USSR, i.e., it is 21 percent higher. According to WHO statistics, Kazakhstan is in 74th place in this category worldwide, and in 10th place among the union republics, ahead of all the other republics of Central Asia. The Chimkent and Dzhambul oblasts alone, where 17 percent of the Kazakhstan population resides, account for 27 percent of the total number of infants in the republic who died before reaching the age of 1 year.

The ineffectiveness of the measures we have taken thus far for protecting the health of mothers and children is largely due to our ignorance of the special regional features of the territories. For example, the northern and southern oblasts and the urban and rural areas demonstrate directly opposite pictures in the structure of causes underlying infant mortality. Whereas the dominant infant mortality in the southern and western regions and in the rural areas occurs among children over one month of age, most children who die in the northern oblasts and urban areas are newborn infants.

There are also perceptible differences in birth rates. The birth rate in the Chimkent Oblast is 32.5 per 1,000 inhabitants, whereas it is 20.5 in the North Kazakhstan Oblast. In the southwestern region, the probability of a child dying during the first year of life is, on the average, twice as high because the indicators for the status of health of mothers here are more unfavorable. In that connection, as an analysis of infant mortality in the Chimkent Oblast has shown, one out of every three deceased children was from a multichild family in which the interval between births was less than one and one-half years. Two out of every five deceased children were born to sick mothers. The clear underestimation of this factor has resulted, in practical terms, in the inaccessibility of medical assistance for most children.

In spite of such striking differences, the approaches to the distribution of health sector resources have been evenly balanced and have been structured on the basis of average figures. For example, the number of pediatricians and gynecologist-obstetricians per 10,000 population for Kazakhstan and its oblasts is in line with the national average. But if one evaluates the situation with respect to the child population and the number of cities, the picture looks radically different: our republic is provided with half as many pediatricians and with fewer gynecologist-obstetricians by a factor of 1.5. The disproportion is particularly large in the oblasts with the highest birth rates. In the Chimkent, Dzhambul, and Kzyl-Orda oblasts, the number of pediatricians and gynecologist-obstetricians is lower than the average national figures by factors of 3 and 2.5. The work load per gynecologist-obstetrician in the Chimkent Oblast is 208 births per year, whereas that figure is 88 in the North Kazakhstan Oblast and 60-70 births in the Baltic republics.

For the purpose of correcting the errors that had been made in personnel policy, the Kazakh SSR Ministry of Health changed the principles applied for the assignment of young specialists in favor of the oblasts with shortages in medical personnel. For example, in 1988, instead of the 150-200 physicians assigned to the Chimkent Oblast in previous years, 400 physicians were assigned.

A child's health is determined by the status of its mother's health. That is why the low health indicators for women are particularly alarming today. Unfortunately, the level of gynecological morbidity among women of child-bearing age (more than 4.5 million persons) in the republic is high. There has been a rise in the number of cardiovascular pathologies and kidney diseases, which are the most frequent cause of serious illness and complications during pregnancy and childbirth and, consequently, result in a high level of maternal mortality and premature births and widespread incidence of various pathological conditions in newborn children.

The extremely poor diet of women should be noted. That diet is extremely deficient in dairy, vegetable, fruit, and meat and fish products. Because of that deficiency, up to 60 percent of the pregnant women in the cities and up to 80 percent in the rural areas suffer from anemia. Almost one out of every three newborn children is born weak and sickly and therefore is not likely to live.

The number of women who work in unfavorable conditions (more than 260,000 individuals) is declining slowly. Most of those women (220,000, or 84 percent) are working at enterprises of the Gosagroprom. Some 36,000 women are employed in jobs that involve heavy physical labor. Enterprises of the metallurgical industry employ 16,000 of those women, light industry employs 9,000, the Gosagroprom, 10,000. A total of 140,000 work night shifts. There are almost no industrial enterprises in the republic in which there are shops for pregnant women, and the transfer of persons to light

labor is, at best, limited to reducing the workload by 25-50 percent, without removing such workers from the common shop, i.e., the harmful factors affecting the bodies of the future mother and the child are in no way eliminated.

The recovery facilities for pregnant and gynecological patients are extremely inadequate. The republic has a total of 188 sanatorium-dispensaries that can accommodate 21,000 persons. At the same time, very few places are allotted to the women contingent here, in spite of the fact that up to 5 percent of the pregnant women annually require recovery. According to existing standards (3.3 beds per 1,000 pregnant women), we should have 1,300-1,400 sanatorium beds in our republic. That number of beds could provide for the recovery of 24,000 pregnant women. This problem has not been resolved on the local level.

In contrast to the developed countries, artificial interruption of pregnancy remains the most prevalent method of family planning in our republic. For every 400,000 births, there are an equal number of abortions. However, the performance of abortions under normal conditions, with proper anesthesia, is virtually impossible in certain areas. That is the reason for the widespread introduction of contraception. This is not simply a question of medicine and of a humane attitude toward women and their health—it is also a burning social issue which must be resolved without delay. Fortunately, we already have some experience in that regard at the Chimkent Fosfor Association, where contraceptives are made available free of charge and are paid for with the funds of enterprises.

Abortion is a fundamentally unacceptable method of interrupting a pregnancy and is a product of poor health education. We must undertake a mass publicity program on contraception and sex hygiene among girls, juveniles, *tekhnikum* and VUZ students, vo-tech students, etc. Every woman should be provided with a hygiene schedule, and girls in the ninth and tenth grades should be prepared for future motherhood.

There are many other unresolved problems, particularly the need for IUD's (1,200,000 units), which has been only one-half filled. There is also the need for hormone preparations (140,000,000 packages), which has only been 30 percent satisfied. Out of the 205 central rayon hospitals of the republic, only 10 so far have performed mini-abortions.

The percentage of abortions and births of non-viable children is high among women afflicted with alcoholism, drug addiction, and mental illness. On a number of occasions, the Ministry of Health has requested that the Ministry of Justice decide on the issue of compulsory contraception for this contingent, but has not yet received a response, although this kind of preventive measure would help to prevent the birth of more than



1,000 mentally retarded children whose financial support costs the state more than 1.5 million rubles annually.

The situation with regard to the construction of children's facilities and maternity homes is extremely unsatisfactory. Allotted capital investments are not being utilized, and construction dates are being stretched out over many years. New maternity homes were supposed to have begun operation in 1988 in Ust-Kamenogorsk, Guryev, and Petropavlovsk, but to this day the opening of those homes remains an open question.

The highest index of newborn mortality has been recorded in the Kokchetav, Pavlodar and East-Kazakhstan oblasts. The reasons for this include overcrowding of maternity homes and shortages of obstetrics ward beds, which result in intra-hospital infection and group illnesses among the newborns. Similar critical situations have been noted every year in the republic: in Karagand, Semipalatinsk, and Alma-Ata in 1987, and in Kokchetav, the Naurzumskiy Rayon, and the Kustanay Oblast in 1988. More than 300 children die every year of sepsis. The cities are awaiting a quick resolution of the problem of bringing the space in maternity homes and obstetric stations up to standard levels and of allocating reserve maternity homes in cities with only one maternity home (Arkalyk, Guryev, Dzezkazgan, Kzyl-Orda, Kustanay) to the point of converting somatic beds into obstetric beds. This problem should be resolved before the end of 1989.

A still important problem is the (pre-birth) diagnosis of congenital developmental defects, with which more than 7,000 children are born in the republic each year. If the number of newborn deaths due to congenital heart defects were at least cut in half, the child mortality rate would be reduced considerably (by 7 percent). The resolution of this problem could be facilitated by the universal introduction of ultrasound examination of all pregnant women. This would require 60 machines at a total cost of 2 million rubles in foreign exchange.

There has been a rise in the rate of premature births in the Kazakh SSR, particularly in the urban areas (up to 8 percent). The mortality rate of premature children is 28 times higher than it is for full-term newborn infants. This doubtless requires greater expenditures for nursing care. Only 10 percent of the required incubators has been supplied to the republic's maternity homes.

Other reasons are predominantly responsible for death among children one year or under in the rural areas (32.2 per 1,000 births). For example, two-thirds of the children perish either at home or within the first few days after admission to a hospital. This is indicative of poor health education and delayed action on the part of parents. There is a specific relationship between the mortality rate and factors such as the lack of communications. Even now, almost every other FAP [feldsher-obstetric station] is without telephone service. Unfortunately,

child deaths are frequently due to the lack of transportation or delayed delivery to a hospital.

Nutrition among children remains an acute problem. The republic has more than 400,000 children under the age of one year, and up to 70 percent of them are on mixed or artificial feeding. Quite a few problems are associated with nutrition among more than a million preschoolers as well as 4.5 million children of school age.

The dairy kitchens that operate within the health care system are performing the uncharacteristic function of being the principal producers of food products for children under one year of age. However, the overwhelming majority of dairy kitchens the 757 dairy kitchens have a small service capacity, are not mechanized, and, as a rule, are situated in makeshift premises that do not meet sanitation standards.

The funds allotted to Kazakhstan satisfy only 50 percent of the children's needs for dry dairy mixes and only 3.5 percent of their needs for canned meats, and that must be brought in from outside the republic's borders. Moreover, we cannot expect a substantial increase in the funds for such products in the future.

The production of fruit and vegetable juices and purees at the Alma-Ata, Tyulkubass, and Sayram fruit canneries satisfies only 9 percent of the children's needs; 21 percent of those needs are met if one counts imports from outside the republic. There is a dire shortage of homogenized canned foods for children under one year of age.

In connection with the situation that has evolved we must undertake a fundamental restructuring of the entire area of children's nutrition in the republic along the following lines. We believe that after the development of a children's nutrition industry, all of the small dairy kitchens within the Ministry of Health system (and they constitute 80 percent of the kitchens), which are not profitable and are potentially dangerous in terms of the poor quality of their products, should be liquidated, and the 12 large, mechanized kitchens in the cities should be transferred to the jurisdiction of Gosagroprom within a year.

Unfortunately, the republic has halted the production of the Baldyrgan and Babobek baby foods, whose efficacy has been proven in practice. We hope that the same fate does not await the antianemia product Zhiger, whose production is slated at only four dairy plants instead of the originally planned 17 plants.

The unsatisfactory water supply situation is an important factor contributing to the high rate of public morbidity, especially infectious morbidity. Centralized water supply is provided for 70 percent of the cities and for 51 percent of the villages. The percentages for the East-Kazakhstan, Guryev, and Pavlodar oblasts are 19 percent, 37 percent, and 40 percent, respectively. The indices for the average daily consumption of water for the urban and rural areas is less than half the norm.



The supply of potable water in the Kzyl-Orda Oblast represents an extremely grave situation, where 40 liters daily goes to each urban resident and 15 liters goes to each rural inhabitant. Those figures are 80 and 25 liters, respectively, in the Kokchetav Oblast and 80 and 30 liters in the Aktyubinsk Oblast, whereas the standard urban and rural consumption rates are 550 and 125 liters, respectively. The water supply situation is extraordinarily bad in Guryev and in the center of the Caspian petroleum and gas producing complex, the settlement of Kulsary.

As of the present time, 7.5 percent of the tests of potable water do not satisfy the GOST standards in terms of bacteriological indices, and 12.7 percent do not satisfy the standard in terms of chemical indices. Those indices are 2-3 times worse in the Kzyl-Orda, Kokchetav, and Kustanay oblasts. There are some populated areas where none of the water samples tested meet the standard requirements.

Many water reservoirs of the republic, especially the basin of the Irtysh River (Ilek River) and Syrdarya, have become unfit for use as a result of the activities of enterprises of non-ferrous metallurgy, the chemical industry, and the mineral fertilizer industry.

The republic's gosagroprom annually purchases about 45,000 tons of pesticides and 840,000 tons of mineral fertilizers at a cost of 86 million rubles. The agricultural produce grown in our fields has a high residual content of nitrates. The illegal use of ammonium nitrate on melon crops continues.

According to research data from the USSR Academy of Medical Sciences Institute for Regional Nutritional Problems, a high level of DDT, malathion, and hexachlorane has been detected in milk of breast-feeding mothers in the Alma-Ata, Dzhambul, Kokchetav, Kzyl-Orda, and Chimkent oblasts.

We annually record more than 3,000 cases of gastrointestinal and alimentary illnesses and food poisonings, and more than half of the illnesses are associated with the consumption of melon and vegetable produce.

Every year, the republic records about 2 million cases of pediatric infections, while at the same time the availability of infectious disease hospital beds is 3.5 times lower than the norm (a shortage of 26,000 beds). That deficit must be eliminated in the next two years by converting pediatric somatic hospitals.

The supply of drugs remains one of the worst bottlenecks in the health sector. Out of the 271 listed drugs used in pediatrics and obstetrics, only 133 of those drugs are available in the republic. Only 49 percent of our needs have been filled. That includes such items as antibiotics, sulfanilamides, vitamins, interferon, saline solutions, and other medicinal preparations in short supply. No allocations at all have been made for 23 of the listed drugs.

The organization of resuscitation and intensive care departments is of considerable importance to a reduction in maternal and child mortality rates. As of today, such units exist in 32 out of the 205 central rayon hospitals, in 14 out of 16 pediatric hospitals, and in eight out of 50 maternity homes. Such departments must be opened in all central rayon hospitals and maternity homes. However, that urgent task is being held up by a shortage of equipment. We have a shortage of up to 400 units each of anesthetic-respiratory machines, electroaspirators, incubators, and microanalyzers. Unfortunately, the leftovers principle for supplying the health care sector remains in place, even when the lives of mothers and children are at stake.

In the republic, every fifth girl is ill, 6 percent of whom suffer from gynecological illnesses. The health care sector, public education, and trade unions must restructure their work in such a way that they can fix their attention on the generation that is growing up; in the near future, they must open new sanatoria, health-recovery camps, and health-restoration centers.

The Ministry of Health system has today only 42 pediatric somatic sanatoriums, and in them some 27,000 children are undergoing recovery. In addition, the trade union sanatoriums have 2,500 children, but there are 600,000 children who need sanatorium treatment. Thus, only 6 percent of our needs are satisfied. There also seems to be no movement towards resolving the problem of providing recovery facilities for parents with their children. Over the last two years, a total of only 5.5 percent of those persons needing rest and treatment actually underwent that rest and treatment.

Overcoming the backwardness in health and hygiene education among the Kazakh SSR population is extremely difficult because of the scarcity of printed medical information, especially materials in the ethnic languages of the rural residents. Primarily, this problem is acute in the 30 rural rayons of the republic that are the most backward in socioeconomic terms and have the highest maternal and child mortality rates. Those rayons have up to 1 million inhabitants, 90 percent of whom are indigenous nationals. In light of what has been said, we believe that the decision of the Kazakh SSR Ministry of Health to publish a new popular medical magazine, *DENSAULYK* (Health), is justified.

The training of specialists at the republic's medical VUZes is of poor quality. This is confirmed by the fact that 14 percent of the physicians were denied their licenses following a certification process. What can one say about the quality of the work of obstetrics and pediatrics departments at the Aktyubinsk and Semipalatinsk institutes if those oblasts have such a high rate of child mortality!

The restructuring of the health care services for mothers and children in the light of the decree of the Central Committee of the Kazakh Communist Party and government on the basic guidelines for the development of the

health care sector in the period leading up to the year 2000 is based on a new concept whose essence consists in a regional approach to health sector planning and a precise identification of priorities. One should note that this program includes a set of measures that do not require large capital investments. We are putting our primary emphasis on family planning; medical care for women and young children; a higher level of social and legal protection for mother and child; better skills among medical personnel, particularly in the rural areas; prevention of intestinal infections; a radical improvement in public health and hygiene education; and better health care administration.

The high priority informing the resolution of problems involving the care of mothers and children must be seen in a radical improvement in the material-technical base of maternity and pediatric facilities. No less than 40 percent of capital investments has been slated for the construction of such facilities, unlike the 27 percent that is the case at present. Maternity homes and pediatric hospitals must be constructed by new designs so that the cost of a single bed in such hospitals would be 30,000-50,000 rubles instead of 15,000. The highest-priority problems include the task of providing joint accommodations for mothers and their children under 3 years of age in maternal and children's wards. This is to be accomplished in the immediate years ahead by renovating administrative buildings transferred by the local soviets, currently operating pediatric hospitals, and maternity homes. Centers for caring for mothers and children are slated for construction during the 13th Five-Year Plan in Alma-Ata and Chimkent.

The regional concept of solving problems involving the care of mothers and children, based on the actual situation in the republic, requires that there be a concentration of efforts primarily in the southern and rural regions. This requires the involvement of all scientific-research institutes, medical VUZes, and health care units of the oblasts with better health care indices. The ispolkoms in those oblasts must immediately resolve the problem of allocating funds for additional public health service pediatric nurses and obstetric positions.

The organization of consultative-diagnostic centers with pediatric departments is of considerable importance. The improvement in pediatric polyclinic and prenatal services has recently taken on particular significance. We envision the improvement in the operation of these institutions through greater efficiency on the part of the medical personnel and the child health education offices and classes, and the completed enlargement of the pediatric and obstetric sectors.

The organization of rehabilitative treatment departments and polyclinics at industrial enterprises should be continued, and new forms of medical services should be introduced on a wider basis. These include day hospitals, particularly for women's recovery; home care; non-registration type services (with transfer of records to patients), etc.

The regional comprehensive program for protecting the health of women and children goes far beyond the limits of departmental capabilities. It cannot be resolved by the efforts of the health sector alone. Success in this endeavor, which is of statewide importance, demands the active participation of the republic's entire national economic complex in the protection of the health mother and child.

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### Environment-Related Child Morbidity in Nizhnyi Tagil

907C0675A Moscow SEMYA in Russian No 22,  
28 May 90-3 Jun 90 p 7

[Article by L. Yermakova: "The Children of Nizhnyi Tagil Wear a Fiery Necklace. It May Take Radical Child Protection Laws To Remove It."]

[Text]When you look at this city from a height, it is a unique sight: thousands of lights and fires from blast-furnaces, open-hearth furnaces, and rolling mills. Flashes of light surround the city in a gigantic ring that is alive all the time: first it gets brighter, then it fades away, then it flares up again. Within this ring an intense life goes on constantly without stopping for even a moment.

There are over 40 large-scale industrial enterprises in Nizhnyi Tagil. They encircle the city like a distinctive, fiery necklace. The former, settlement of Demidov settlement was turned, practically overnight, into a city of half a million.

Nizhnyi Tagil, like many other towns in the Urals, has been called a working city. It truly toils without sparing itself. At the same time, however, the executives of the city and of the central ministries whose plants have grown up on this soil have apparently forgotten that Tagil's residents are not only master craftsmen but also people who need to rest, raise children, undergo medical treatment, and have a good meal after their work shifts. The social sphere has been greatly neglected, and has become detached from the plants. And there is simply no time for concern about ecology. Decades ago, some Tagillians were already worrying, "What if the fiery necklace smothers the city..." But it was forbidden to talk about this aloud. And when the city fathers reported above-plan production of ore, metal, and plastics to the top authorities, they were swiftly promoted and left Tagil forever.

As of January 1, 1990, the amount of toxic substances emitted into the atmosphere by the city's enterprises constituted 607 thousand tons per year, i.e., almost one and a half tons for each resident, including the very young. When vehicle exhaust is included, the number increases by another 100 thousand tons. It is no surprise that the most widespread diseases of children in Nizhnyi Tagil are respiratory: bronchitis, bronchial asthma and

acute pneumonia. An increase in nervous system disorders has also been observed. The youngsters have twice as many cases of allergic dermatitis and eye infections than children in other cities of this oblast. The children are born weak, with depressed immunity and congenital deformities. After all, childhood ecology starts with maternal ecology. In 1989, of 5,436 newborns 123 infants failed to survive the first year of life.

The specialists of the Resuscitation and Pulmonary Department of Children's Hospital No. 2 can determine with almost 100 percent certainty when the stream of patients will increase: this happens when the east wind begins to blow and plumes of smoke from the plants' smokestacks crawl sinisterly into the city. Children begin to experience scratchy throats, nausea, and elevated blood pressure. Many of them cough and gasp for air. Not long ago, doctors used to treat children with home made inhalers: steam from ordinary pots with a tent placed over the heat source. Imported respiratory equipment is making an appearance, but in very scanty numbers. The present funding seems absurd—as I. Fasaikhov, the manager of the municipal health department, said during a meeting with President I. M. Gorbachev—for the Nizhniy Tagil physicians receive the same allotments as other cities. Despite the fact that many of them look like resort areas in comparison to the Ural cities. In the past five years the death rate in Nizhniy Tagil has exceeded those of the oblast and republic.

Nizhniy Tagil has been compared to a gravely ill person. Some sectors of the city have become virtual ecologic disaster zones. And children live there, too.

Boarding School No 31 for Retarded Children is located across from the smoking coke-oven battery of an integrated steel plant. And right in the vicinity there is a cement plant, close at hand. Ironically, its workers are the school's bosses. They receive milk as hazard pay.

The degree of air pollution around the boarding house is 16 percent higher than the average for the city. Experts assess it as being extremely severe. What is more: year-round. In the winter, children play in snow that is yellowish-brown, not white.

"You walk to school sometimes in a smokey haze. You crunch cement on your teeth," relate the educators from the boarding school. It is impossible to open the windows in classrooms, because the window sills immediately become grey with dust.

Headaches, bronchitis, and persistent sleepiness torment the grownups. Teachers and educators hurry home to be far away from this cursed place as soon as they finish work. But the children live here around the clock. Every day they go for a walk before going to bed to have some "fresh air". A nurse, V. Nikiforova, says that the children constantly complain of headaches and that many have inflamed eyes or the early stages of conjunctivitis. Every other child is coughing.

City administrators have debated the question of relocating the boarding house to a more favorable area. Last year, repairs weren't even started, but judging by the fact that repairs are now being actively performed, the children will have to live here for a long time to come.

Perhaps this attitude toward the disastrous position of retarded fellow citizens may be explained by the fact that the city expects no great return from them in future. Yet in the same neighborhood as the boarding school there are four kindergartens, a high school and an orphanage.

"If these children's institutions are also not moved out of the toxic environment, it is probable that their alumni will fill up our boarding school in the future," says trade committee chairwoman and speech therapist L. Kolesnikova. "It is not uncommon to see medical records of our students where instead of remarks about alcoholic parents or birth trauma and bad heredity, the statement 'undetermined etiology' appears." Some experts are beginning to search for the etiologic sources of these diseases.

The executives of central departments whose enterprises are located within the city are well aware of the critical situation of the children of Nizhniy Tagil.

Thus far the situation is as follows: the population of Nizhniy Tagil is suffering damage to their health which can be estimated as equal to 100 million rubles per year. Only one-third of that amount is returned by the ministries. But it is not only millions of rubles that are lost, but also health, which is gone forever and cannot be measured in monetary terms. Hope is also fading that the number of economically [sic] dangerous enterprises will ever change to benign operating conditions, if only for the sake of children, as happened once during President M. S. Gorbachev's visit to Nizhniy Tagil. As long as there are no tough penalties for toxic emissions, making harmful factories economically unprofitable, their managers will remain capable of nothing more than ecological eye-wash.

A new body of deputies, community members, the "Ochishchenye" [Cleansing] ecology club and the physicians of Nizhniy Tagil are trying to help the city's children through their own efforts. A modern center for protection of the health of children and mothers will open soon. It has already been a year since an interregional resuscitation and consultation center was created and put into operation at the Children's Hospital. There is a sanatorium for preschool children who suffer from bronchial asthma and allergic dermatitis.

All these measures, however, appear microscopic in comparison to the enormity of the calamity hanging over the children, who are the future of Nizhniy Tagil.

I spent my last evening in the city with my relative, who has worked here for more than twenty years as a pediatrician and has raised three daughters. She has devoted her entire life to children's health and has been awarded the Order of the Red Banner of Labor. She bitterly told

me about her little patients who are forced to come to her regularly for help, as if they were feeble, old people.

"We doctors are helpless, as long as the picture outside the window remains the same," she summed up our discussion.

By evening the wind had changed its direction. Against the gloomy sky, a black tail of smoke slowly wound itself

into an ominous noose. It drifted toward us to wrap the newly erected buildings on Pikhtovaya Street in an almost palpable shroud. I rushed to close the *fortochka* [small ventilation panel in window] because Alenka, the youngest daughter of my hostess, was sleeping in the room. But a closed window cannot save the children from the smoke monster.



UDC 616.891.4-057-02:613.68+616.68-06:616.891.4-057

**Asthenic Disturbances in Seamen During Long Voyages**

907C0462 Moscow *ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA in Russian*  
Vol 89 No 11, Nov 89 pp 60-65

[Article by V. M. Voloshina; Department of Maritime Medicine (head - professor A. A. Lobenko) Odessa Medical Institute imeni N. I. Pirogov]

[Abstract] A study of a group of sailors ranging in age from 20-60 years with different asthenic disturbances

included examination of 87 seamen on long cruises. The investigation revealed psychogenic, physiogenic, cerebrogenic and somatogenic asthenias caused by extreme factors. These asthenias were divided into 3 variants: non-pathological adaptational asthenic reactions, premorbid asthenic states and asthenic disturbances. Symptoms included high irritability, disturbances of sleep and autonomic dysfunctions. Psychological and autonomic indicators of the nonpathological premorbid and morbid variants were described and discussed. The findings were recommended for use in detection of persons at high risk of neuroses and in construction of a differentiated system of prevention and correction of these asthenic states. Figures 10 (Russian).

UDC 577.391

**Affliction and Chemical Protection in Experimental Intestinal Radiation Syndrome**

907C0618E Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR; SERIYA B—GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 3, Mar 90 (manuscript received 7 Jul 89) pp 78-81

[Article by L. N. Rasina, V. A. Baraboy, and Ye. Ye. Chebotarev, Institute of Oncology, Ukrainian SSR Academy of Sciences, Kiev; Urals Department, Institute of Plant and Animal Ecology, USSR Academy of Sciences, Sverdlovsk]

[Abstract] BALB mice were employed in gamma irradiation experiments to assess the dose reduction factor in intestinal radiation syndrome of cystamine and a number of triazole and thiazole agents. The experimental approach included intraperitoneal or per os administration of the agents to 23-25 g animals subjected a  $LD_{100/5} = 9.5$  Gy dose, and determination of intestinal stem cell 50 percent survival rate. The results showed that under the conditions specified the dose reduction factor for cystamine was 1.22, and ranged from 1.00 to 1.11 for 2-(B-diethylaminoethylthio-6-methyl) pyrimidine-4, 2,4-bis (B-N-morpholinoethylthio)-6-methylpyrimidine, 2-amino-4-(2-pyridyl)-thiazole, 2-amino-4-phenylthiazole, 2-morpholino-5-(pyridyl-4)-6H-1,3,4-thiadiazine, 1,1,2,2-tetramorpholinethane, and 3-thione-4-amino-5-(3,5-dimethyl-pyrazolyl)-triazole. Tables 1; references 10: 8 Russian, 2 Western.

UDC 577.391.621.386.86

**Radioprotective Activity and Mechanism of Dimethylaminodithiazine Action**

907C0645A Moscow RADIOBIOLOGIYA in Russian Vol 30 No 1, Jan-Feb 90 (manuscript received 7 Sep 89) pp 69-75

[Article by V. G. Vladimirov, Yu. Ye. Strelnikov, S. V. Amosova, G. M. Gavrilova, V. I. Gostevskaya, A. S. Petrov, and L. A. Sharova, Scientific Research Institute of Military Medicine, USSR Ministry of Defense, Leningrad]

[Abstract] A series of heterocyclic compounds, dimethylaminodithiazines with thiourea groups, were synthesized as part of a screening program for radioprotective agents. Trials on 19-21 g outbred male mice subjected to 7.5 Gy gamma irradiation demonstrated that most of the 15 agents significantly improved 30 day survival figures to approximately 50-75 percent from 8 percent control

survival. The agents were equally effective whether administered intraperitoneally or per os in relatively low doses (usually 5-20 mg/kg). Detailed studies with a model agent, 2H,6H-2,6-dimethyl-4-amino-1,3,5-dithiazine, demonstrated that the agent inhibited DNA synthesis within an hour of administration, as well as oxidative processes which led to a 5°C drop in body temperature. In addition, although seemingly unrelated to radioprotective action, the agent also led to significant depression of cAMP/cGMP ratio, suggesting predominance of cholinergic effects. Tables 4; references 10: 6 Russian, 4 Western.

UDC 577.391.541.132

**Effects of Radioprotective Agents on Na,K-ATPase Active Transport System**

907C0645B Moscow RADIOBIOLOGIYA in Russian Vol 30 No 1, Jan-Feb 90 (manuscript received 27 Jan 89) pp 76-79

[Article by A. I. Dvoretzkiy and Ye. G. Yegorova, Scientific Research Institute of Biology, Dnepropetrovsk State University]

[Abstract] In vivo and in vitro studies were conducted in order to further assess the mechanism of the radioprotective action of serotonin, dopamine, histamine, MEA and AET on plasma membrane Na,K-ATPase activity. The in vivo studies conducted on 120-150 g male Wistar rats showed that intraperitoneal administration of biogenic amines (60-100 mg/kg) or MEA (150 mg/kg) or AET (250 mg/kg) for the most part inhibited Na,K-ATPase activity in the spleen, thymus, small intestinal mucosa, liver, kidneys, and cerebral cortex. Confirmatory data were obtained in the in vitro studies. Inhibition of Na,K-ATPase activity facilitated maintenance of the cellular ATP level which, in cases of activation of adenylate cyclase, leads to production of cAMP. The latter serves to activate protein kinases, enzymes that have been shown to underlie radioresistance. Tables 2; references 14: 8 Russian, 6 Western.

UDC 577.391.621.386.86

**Radioprotective Mechanisms of Action of Cystamine and Mexamine**

907C0645C Moscow RADIOBIOLOGIYA in Russian Vol 30 No 1, Jan-Feb 90 (manuscript received 9 Feb 89) pp 84-87

[Article by N. G. Chigareva, I. N. Morozova, and S. P. Deyev, Military Medicine Academy imeni S. M. Kirov, Leningrad]

[Abstract] An analysis was conducted on the similarities and differences in the radioprotective mechanisms of action of cystamine and mexamine on the hemopoietic bone marrow cells and the functional activity of neutrophilic granulocytes employing outbred and BALB/c mice and outbred rats. The series of studies demonstrated that

an immediate effect of both agents is the 40-50 percent depression of DNA synthesis in the bone marrow. Exogenous colony formation studies revealed that while cystamine induced a two-fold depression of bone marrow colony formation, peripheral blood colony formation was increased

two-fold. Mexamine, on the other hand, enhanced bone marrow colony formation 1.5-fold while depressing peripheral blood colony formation 2.4-fold. Both agents, however, activated cationic proteins in neutrophils. Figures 2; tables 1; references 8: 5 Russian, 3 Western.

UDC 616.153.962.4-097:578.891]-008.97-078.338

**Screening of HBsAg Carriers by 'Group' Passive Hemagglutination<sup>1</sup>***907C0094 Moscow LABORATORNOYE DELO  
in Russian No 7, Jul 89 pp 59-60*

[Article by Yu. M. Feldman, L. G. Machaneva, D. M. Dubenko, and I. S. Durasova, Zhitomir City and Oblast Sanitation and Epidemiology Station]

[Text] Hepatitis B morbidity has not been decreasing. Its true level considerably exceeds the officially recorded level,<sup>6</sup> and the incidence of HBsAg carriers in the developed countries, including the USSR, has reached 1-5 percent.<sup>2, 5, 7</sup> Therefore, the fullest possible identification of carriers, particularly among blood donors and epidemiologically high-risk groups, plays a large role in the prevention of this serious infectious disease.

In the meantime, the thoroughness of the identification of hepatitis B virus carriers is a function primarily of the sensitivity of laboratory diagnostics tests.

The counter-current immunoelectrophoresis (CIEP) method is still being used in the USSR to screen carriers. However, this method is not very sensitive. It is also cumbersome and labor-intensive. In addition, it is not very specific and a considerable amount of time is required to obtain conclusive results. Therefore, the adoption of more sensitive methods, such as third-generation methods, constitutes an important task in the prevention of Hepatitis B.

Among such methods for identifying virus carriers is the passive hemagglutination test (PHA), which is ten times more sensitive than CIEP, but considerably less sensitive than the enzyme immunoassay or radioimmunoassay.<sup>1, 3, 5, 8, 9</sup>

As a highly sensitive and specific method, PHA can yield results in 30 minutes and identify more HBsAg carriers among donors than is possible with CIEP.<sup>4</sup> Therefore, the broad introduction of PHA might help to improve the identification of virus carriers.

However, broad and universal employment of PHA, particularly in blood service facilities, is being hampered by the shortage of commercial test kits. Therefore, a considerable increase in the production of such test preparations would be a primary way to resolve this problem. But this approach (of course, an essential one) requires capital expenditures to increase production capacities and would require a considerable amount of time.

But there is another way, which we are proposing, i.e., reduce the consumption of test kits (perhaps, as a temporary measure). We propose running this test by the "group" method, which would include a mixture of four sera in order to expand the screening of hepatitis B carriers by the PHA method.

In setting up the PHA test in accordance with the "instructions," the test serum is diluted eightfold. Therefore, in testing a group of four sera, with subsequent twofold dilution with an isotonic NaCl solution, the final dilution of each serum would not change. Such a method would not contradict the current instructional documents and would be theoretically sound. In order to prove the feasibility of employment of PHA by the group method, we tested its sensitivity and specificity.

**Materials and Methods**

1. Samples of donor blood serum free of HBsAg (determined in individual PHA testing) were mixed in four equal quantities, and the mixture was diluted twofold with an isotonic NaCl solution. This mixture was examined in the PHA by a micro method. A total of 284 serum samples were examined. Only transparent, "chylous" samples were used in the experiment, and serum samples that exhibited signs of hemolysis were discarded.

2. Blood serum containing HBsAg was mixed with three samples of serum (in various amounts) that were free of HBsAg, and then diluted twofold with isotonic solution and tested by PHA. The experiment included 17 samples of serum in which HBsAg was detected by PHA in individual tests.

3. By means of twofold dilutions, we measured the maximum titer (MT) of HBsAg in the sera of the carriers. The MT was considered to be the maximum dilution of the serum that yielded a positive reaction in the PHA. We took the serum containing 8 MTs and mixed them with three HBsAg-free serum samples, and the mixture was diluted twofold with isotonic solution, i.e., such a mixture contained 1 MT of antigen. Seventeen serum samples were tested by PHA.

4. We examined 296 serum samples that included 15 antigen-positive samples in the "coded" experiment. The sera were divided into groups and tested in mixtures containing four sera each. When positive reactions were obtained in a mixture of sera, each serum from that mixture was tested individually.

5. In the "field" experiment, we examined 1,688 serum samples from donors with individual and group methods simultaneously.

All of the tests were performed simultaneously in the laboratories of the city and oblast sanitation and epidemiology stations in order to obtain objective results.

**Results and Discussion**

There was not a single positive reaction in the 284 HBsAg-free serum samples tested by the group PHA method in mixtures containing four sera each.

When we examined groups of sera that contained one serum with HBsAg, the PHA was positive in all cases with the mixture of sera. The PHA test was also positive in the mixture of sera containing no more than 1 MT of the HBsAg.



Our examination of the 296 serum samples in the coded experiment with groups of four sera detected all 15 sera containing HBsAg.

Our examination of 1,688 samples of donor serum in the field experiment by groups of four sera detected 16 HBsAg carriers both in the group and the individual PHAs. However, 17 non-specific positive reactions were obtained in the group test. In these cases, PHA was again used with each serum included into the group. Thus, in our examination of 1,688 serum samples by the group method (including the repeated experiments that yielded positive and false-positive reactions), we performed 554 PHA tests (422 by the group method, and the remaining being repeat tests—64 with positive and 68 with false positive readings), i.e., in this case, the use of test materials was cut to one-third of that in the individual testing method.

Our examinations indicate that the group PHA method is sufficiently specific and is no less sensitive than the PHA testing of individual sera. The employment of this kind of PHA testing practically quadruples the number of sera samples that can be examined with this kind of test, without increasing the production of test materials.

The group PHA method reduces considerably (by more than a factor of three) labor and the laboratory equipment needed.

The group PHA method also yields a considerable economic advantage. For example, approximately 40,000 serum samples are annually tested for HBsAg in the Zhitomir Oblast. The testing of that number of serum samples by PHA requires 270 diagnostic test kits, at a total cost of 2,500 rubles. The testing of sera by the group method entails the use of 90 diagnostic test kits, i.e., an annual saving of approximately 2,000 rubles for one oblast alone.

We believe that the group PHA method, particularly in the screening of HBsAg carriers among donors, will enable this test to be used on a considerably wider basis, without increasing the production of diagnostic test materials.

#### Conclusions

A method of PHA has been suggested that tests a mixture of sera (group method) in the screening of HBsAg carriers and reduces to less than one-third the use of diagnostic materials and labor.

#### Footnotes

1. The editorial board does not doubt the reliability of the data cited by the article's authors on the detection of HBsAg by the "group" method. However, a recent, posthumously identified Leningrad AIDS case in which a similar laboratory virus-carrier detection test was used and the test results were negative indicate that the "group" method for detecting HBsAg requires some caution. This is apparently also the opinion of the

article's authors, inasmuch as only transparent "chylous" serum samples were utilized; sera with signs of hemolysis were discarded.—Eds.

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#### Biology of Virus of California Encephalitis Complex, Isolated in Karelian ASSR

907C0471A Bratislava ACTA VIROLOGICA  
in Russian Vol 33 No 4, Jul 89 pp 326-331

[Article by D. K. Lvov, L. N. Abramova, N. S. Savosina et al.; Institute of Virology imeni I. I. Ivanovskiy, USSR Academy of Sciences, Moscow]

[Abstract] A virological study of Aedes mosquitoes collected in Muezerskiy Rayon in the Karelian ASSR isolated a virus (strain LEIV-9251 Kar) of the Bunyaviridae family, a representative of the California encephalitis complex. A study of the biological features of the virus and determination of its role in infectious pathology of animals involved experiments on white mice, Syrian hamsters and monkeys. The strain demonstrated significant pathogenicity for the laboratory animals. White mice infected by the virus experienced paralysis of the rear extremities and death within 4-7 days. An increase of the infectious titer of the virus produced generalized infection. The highest titer of the virus was found in the brain tissue. The location and nature of the lesions in mice infected intravenously and subcutaneously were

similar and included pronounced encephalitis, dystrophy of the hepatic parenchyma and circulatory distresses. Hamsters died on the 7th day after intravenous infection but did not die after subcutaneous infection. Histological study of organs of hamsters infected by the different pathways showed a similar location and nature of the lesion: encephalitis and dystrophy of the liver. Lesions typical of encephalitis appeared in the hamster brains after 21 days. Monkeys infected subcutaneously or intravenously displayed no clinically pronounced signs of infection for 30 days (the length of observation). The virus was found in the blood and internal organs and typical inflammatory and dystrophic changes appeared in the brain, liver and kidneys. The pathogenic properties of the strain characterized it as a pantropic virus, spread by a hematogenic pathway which could possibly produce chronic (latent) infection of rodents in nature and confirmed its epidemiological significance. The strain is highly heat resistant. Complete inactivation occurred only after 21 days at room temperature (24°C) or after 30 minutes at 56°C. It survives well in a neutral medium. References 4: 3 Russian; 1 Western.

#### **Experimental Infection of Red Squirrels *Sciurus vulgaris*, Caused by Monkey Smallpox Virus**

[907C0471B Bratislava *ACTA VIROLOGICA*  
in Russian Vol 33 No 4, Jul 89 p 372

[Article by S. S. Marennikova, E. M. Shelukhina and O. A. Zhukova; Moscow Scientific Research Institute of Viral Preparations, USSR Ministry of Health]

[Abstract] An earlier report of isolation of monkey smallpox virus from the wild African squirrel *Funisciurus anerythrus*, confirmed later by detection of antibodies to this virus in 24.7 percent of *Funisciurus anerythrus* and 16 percent of *Heliosciurus rufobrachium* squirrels studied suggested that these animals are a reservoir of monkey smallpox virus and prompted determination of the type of infection developing in squirrels after different pathways of entry of the virus. Squirrels were infected intranasally, perorally and or on a 5x5 section of scarified skin in a dose of 10<sup>6</sup> monkey OOE. The animals' temperature increased within a day after infection and they became anergic, immobile and stopped eating. Difficulty in breathing occurred later. Symptoms appeared most quickly in animals infected intranasally or perorally and appeared more slowly in animals infected on the skin. No lesions appeared on the skin. All animals died on the 7th-8th day after infection, regardless of the method of infection. Autopsy showed intestinal distension and changes in the lungs (sections of hepatization) in all animals. Internal organs and nasal discharge contained high concentrations of the virus. The study confirmed the high susceptibility of squirrels to monkey smallpox virus, which can cause acute infection after different means of entry into the animal. References 2: 1 Russian; 1 Western.

UDC 577.133.3

#### **Inhibition of HIV Virus in Cell Culture by 5'-phosphonates of 3'-azido-2',3'-dideoxynucleosides**

907C0531E Moscow *MOLEKULYARNAYA BIOLOGII*  
in Russian Vol 23 No 6, Nov-Dec 89 pp 1716-1724

[Article by N. B. Tarusova, A. A. Khorlin, A. A. Krayevskiy et al.; Institute of Molecular Biology imeni V. A. Engelhardt, USSR Academy of Sciences, Moscow, Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow, All-Union Cardiological Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] A study of antiviral activity of 3'-azido-2',3'-dideoxynucleoside 5'-phosphate analogs 5'-phosphonomethylene-3'-azido-2',3'-dideoxythymidine, 5'-methylphosphonate and 5'-phosphite of 3'-azido-2',3'-dideoxythymidine and 5'-phosphites of 3'-azido-2',3'-dideoxyadenosine and 3'-azido-2',3'-dideoxyguanosine in HIV-infected human lymphoblastoid cells showed that all of the compounds prevented death of the cells while the effectiveness of suppression of HIV reproduction equalled or exceeded the effectiveness of corresponding 3'-azido-2',3'-dideoxynucleosides. Toxicity of the compounds was lower than that of corresponding nucleosides. It was assumed that the substances are transported within the cells and are converted under the effect of cellular nucleotide kinase into analogs of 5'-triphosphates of 3'-azido-2',3'-dideoxynucleosides which could be terminator substrates of virus reverse transcriptases and break off growth of newly-synthesized DNA chains. Figures 2; references 18: 4 Russian; 14 Western.

UDC 578.832'112.6.083.3

#### **Synthesis and Immunologic Properties of Pre-S Region Peptide Segment of Hepatitis B Virus Envelope**

907C0627B Moscow *BIOORGANICHESKAYA KHIMIYA* in Russian Vol 16 No 1, Jan 90 (manuscript received 16 Dec 88; after revision 18 Apr 89) pp 34-40

[Article by R. P. Yevstigneyeva, G. A. Zheltukhina, Ye. I. Prokuronova, V. P. Smirnov\*, Yu. A. Semiletov\*, T. I. Kalinina\*, Yu. Ye. Khydyakov\*, I. S. Khromov\*, M. O. Favorov\* and T. L. Yashina\*, Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov; \*Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow]

[Abstract] In view of the demonstration that antibodies against the pre-S region serve as an early marker of hepatitis B, solid-phase technology was used in synthesizing the 24-41 peptide segment of the N-terminus of the pre-S polypeptide of the hepatitis B virus envelope subtype 'ayw' for serologic studies. Immunization of

mice with peptide segment conjugated to bovine serum albumin (BSA) via glutaraldehyde induced antibodies specific for the peptide segment epitope. Serologic studies on 42 patients with hepatitis B testing positive

for HBsAg showed that 30 were positive when tested for antibodies against the peptide segment-BSA conjugate in solid-phase enzyme immunoassays. Figures 1; tables 2; references 19: 6 Russian, 13 Western.

UDC 629.78:574.68:581.15

**Effects of Space Flight on Arabidopsis Seed Genetics**

907C0651B Moscow KOSMICHESKAYA BIOLOGIYA  
I AVIAKOSMICHESKAYA MEDITSINA in Russian  
Vol 24 No 1, Jan-Feb 90 (manuscript received  
12 May 88) pp 22-25

[Article by I. D. Anikeyeva]

[Abstract] Analysis of the genetic sequelae of 22 space flights ranging from 5 to 1,254 days on Arabidopsis seeds demonstrated that, generally speaking, space flights of 400 days or less were without statistically significant effects. Longer space flight showed a time-related increase in mutation incidence and diminished plant viability and fertility. On balance, diminished plant viability was attributed to accelerated aging resulting from exposure of the seeds to a variety of mechanical, physical, and chemical factors related to space flight. Figures 4; references 14: 9 Russian, 5 Western.

UDC 574.685:582.998.4-154

**Effects of Outer Space Environment on Lettuce (Lactuca Sativa) Seeds Aboard Kosmos Biosatellites**

907C0651C Moscow KOSMICHESKAYA BIOLOGIYA  
I AVIAKOSMICHESKAYA MEDITSINA in Russian  
Vol 24 No 1, Jan-Feb 90 (manuscript received  
13 Jan 89) pp 25-28

[Article by L. V. Nevzgodina, Ye. N. Maksimova, Yu. A. Akatov, Ye. V. Kaminskaya, and A. M. Marennyy]

[Abstract] Lettuce (*Lactuca sativa*) seeds were employed in experiments designed to assess the contribution of solar radiation to general bioeffects. The experiments were conducted with seeds carried aboard biosatellites Kosmos-1129, Kosmos-1514, Kosmos-1760. Some of the seeds were shielded with metallic or metallized foil

(0.008-0.0035 g/cm<sup>2</sup> and subjected to the effects of vacuum, 26 Gy cosmic radiation, and temperature drops (-25°C to 30°C), while unshielded seeds were also exposed to the full spectrum of ultraviolet light. Cytogenetic studies showed that the number of cells with chromosomal aberrations in the shielded seeds were generally several fold higher than in the unshielded seeds. The difference was attributed to photoreactivation mechanisms. Figures 1; tables 2; references 10: 6 Russian, 4 Western.

UDC 629.75:582.542.1-119

**Effects of Space Flight on Wheat Pigments and Lipids**

907C0651J Moscow KOSMICHESKAYA BIOLOGIYA  
I AVIAKOSMICHESKAYA MEDITSINA in Russian  
Vol 24 No 1, Jan-Feb 90 (manuscript received  
22 Jul 88) pp 53-55

[Article by V. B. Rumyantseva, M. N. Merzlyak, A. L. Mashinskiy, and G. S. Nechitaylo]

[Abstract] Chemical studies were conducted on the pigment and lipid status of 19-day-old winter wheat *Erythrospermum* plants grown aboard the Mir space station in December 1987. The results showed that, in comparison with terrestrially grown plants, the concentration of chlorophyll a and b was decreased, although the a/b ratio remained unaffected. Total carotenoids were also reduced in the experimental plants, but the chlorophyll (a+b)/carotenoid ratio was at the control level. Analysis of individual pigments revealed an almost two-fold reduction in beta-carotene, as well as alterations in the other pigment components. The concentration of higher fatty acids was reduced some 1.6-fold. The net reduction in levels of pigments, unsaturated fatty acids and acyl-lipids, and detection of oxidation products indicated enhancement of free-radical oxidation aboard the space station. Nevertheless, an alternative explanation may be that these differences reflected repair processes in the photosynthetic apparatus in response to lipid peroxidation. Figures 1; tables 3; references 15: 7 Russian, 8 Western.



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